SACSCOC

Quality Enhancement Plan

February 1, 2019

Table of Contents

I. Executive Summary

The University of Louisiana Monroe (ULM) is committed to continuously evaluating and improving student learning to help prepare students for additional study and future careers. This commitment is reflected in ULM's Mission Statement: "The University of Louisiana Monroe seeks students who find value in our programs and prepares them to compete, succeed, and contribute in an ever-changing global society through a transformative education." A significant portion (more than 60%) of ULM's first-time, full-time, degree seeking student population pursues a career in STEM or health sciences professions, thus making life sciences an important focus of ULM science initiatives.

Coinciding with the demographics of the student population and ULM's mission statement is its Vision Statement: "The University of Louisiana Monroe will be recognized among the top 200 universities in the nation for excellence in teaching, research, and innovation, with an emphasis on the health sciences." These characteristics and beliefs guided the creation and development of the university's Quality Enhancement Plan, *ULM: FOCUS on Biology*.

Analyses of student success data between 2012 and 2017 identified two introductory, gateway courses hindering fulfillment of ULM's mission and vision. The first, BIOL 1014 - Fundamentals of Anatomy and Physiology I, is the gateway biology course for students on a pre-allied health sciences path, and BIOL 1020 -Principles of Biology I, is the gateway biology course for STEM majors. Approximately 335 students enroll in BIOL 1014 each fall; yet, only 67% earn a passing (ABC) grade. Similarly, of the 330 students who enroll in BIOL 1020 each fall, 76% pass the course. *FOCUS on Biology* seeks to increase student success in these courses through instructional enhancement.

FOCUS will be integrated into all sections of these courses and will be directed and administered by the QEP Coordinator, a biology faculty member hired specifically for this purpose. FOCUS will be taught as a fourth class hour/period during the week. The Coordinator will operate under the supervision of the Director of the School of Sciences, who for these purposes reports directly to the Associate Vice President for Academic Affairs and SACSCOC Liaison.

The primary goal of ULM's QEP is to improve performance and success of STEM and pre-health sciences freshmen students in two gateway biology courses. The QEP will use high-impact practices to implement an innovative strategy focused on improving student learning by enhancing critical thinking. This QEP is a commitment to the university, its students, and future employers to engage students in active learning, help them develop their critical thinking skills, and increase student success in introductory biology courses.

II. Process Used to Develop the QEP

The QEP Planning Committee was appointed on March 9, 2017, by the Associate Vice President for Academic Affairs (AVPAA), followed by an initial meeting on March 17, 2017. At that time, the university was comprised of three colleges: the College of Arts, Education, and Sciences (CAES); the College of Business and Social Sciences (CBSS); and the College of Health and Pharmaceutical Sciences (CHPS). It has since been reorganized into the current four-college arrangement: CAES, CBSS, the College of Health Sciences (CHS), and the College of Pharmacy (COP). Committee membership was composed of faculty, staff, and students from those three colleges; representatives from the University Library and the Student Success Center (SSC); and a community representative.

Section II Table A

QEP Planning Committee (March 2017)		
Name	**Representative Area**	**Program/Unit**
Mary Adams	Arts, Education, and Sciences	English
Shannon Banks	Health and Pharmaceutical Sciences	Toxicology
Christine Berry	Business and Social Sciences	Risk Management & Insurance
Jessica Dolecheck	Health and Pharmaceutical Sciences	Health Studies
Chris Gissendanner	Arts, Education, and Sciences	School of Sciences
Paula Griswold	Health and Pharmaceutical Sciences	College of Health and Pharmaceutical Sciences
Myra Lovett	Arts, Education, and Sciences	School of Education
Barbara Michaelides,	Student Success Center	Student Success Center
Cyndy Robertson	University Library	University Library
Arturo Rodriguez	Business and Social Sciences	Finance
Cliff Tresner	Arts, Education, and Sciences	Art
Kaitlin Neal Arnett	ULM Students	Student Government Association
Hannah Livingston	External Constituents	Community
Sara Webb (added)	ULM Staff	Staff Representative, Scribe, SSC
Julianna Steffek (added)	ULM Students	Graduate Student Representative

The AVPAA charged the committee with creating a proposal aligned with the university's mission and vision statements and to determine ways ULM could cultivate and improve student learning. He suggested examining ULM's practices and institutional data and using ULM's Strategic Plan's Guiding Principles of commitment, accountability, innovation, efficiency, collaboration, and achievement to develop a framework for the planning process.

The AVPAA's overview also urged the committee to consider the following questions:

- What do students need to succeed academically, in the workforce, and in society?
- What skills do employers need from graduates?
- What can faculty do to bridge the gap between student competence and the requirements of the workforce they will enter?

These questions were intended to foster broad conversations about successes, challenges, and pathways for improvement.

With this challenge in mind, the committee initiated a three-part approach toward selecting a topic: listening to constituents, examining institutional data, and creating sample proposals. The first two sections focus on listening to constituents and examining institutional data.

Listening to Constituents

Website

In an effort to educate the ULM community about the QEP and to extract ideas, a website entitled *ULM QEP* (https://www.ulm.edu/qep/) was created. This website was organized in three sections:

- What is the QEP?
- Why Do This?
- Who is Involved?

The site featured a "Give Us Your Ideas" button which directed visitors to a submission form. Visitors were able to select their constituent group (e.g., faculty, staff, student, alumni, or community) and then provide ideas and input. Providing one's name and email was optional, thereby allowing constituents to make anonymous suggestions. Comments reflected a broad range of topics including communication skills, creativity, critical thinking and metacognition, soft skills, transgender issues, financial literacy, and environmental sustainability.

Listening Sessions

The committee organized and facilitated listening sessions for faculty, staff, students, alumni, employers, and community leaders. The purpose of the listening sessions was to offer stakeholders a venue for sharing and discussing ideas. The decision to use this approach was motivated by a desire to ensure that all constituent groups were afforded an opportunity to offer feedback and input in a process that would significantly impact them. Planning for listening sessions started in April 2017, and sessions began in May 2017. These sessions prompted committee members to consider innovative approaches to student learning, find new and enhanced methods for teaching, and envision new processes and programs.

Twenty-six listening sessions were held, each following a similar format. A member of the QEP Planning Committee, serving as a facilitator, made a brief presentation explaining the purpose of the QEP (see Appendix A), and guided a conversation focused around three questions:

- How can ULM improve student learning and success?
- What does a ULM graduate need in the workforce?
- How can ULM foster career preparedness in its graduates?

At sessions attended by the entire committee membership (e.g. General Listening Session), notes of the conversations were recorded. For meetings facilitated by one or a few committee members (e.g. listening session for the faculty of an academic school), the facilitators provided notes to the committee on the ideas that emerged within those discussions.

A General Listening Session with faculty, staff, and students occurred on May 10, 2017, where major categories of competencies for success emerged, each containing several topics and ideas. The ideas generated were broadly categorized as *Literacies/Competencies for Success*. Four major categories and sub-topics emerged:

- Quantitative literacy
    - financial literacy and analytics (e.g., documentation)
- Social literacy
    - multiculturalism/diversity
    - social justice
    - community service
    - citizenship
- Metacognition and qualitative literacy
    - intellectual independence (analysis, inquiry, and debate)
- Inquiry/intellectual preparedness
    - career preparedness/exploration
    - adaptation for the future
    - professionalism/soft skills

At the August 10, 2017 listening session with area business leaders and school superintendents, many of the same ideas were offered. This session, however, generated a more detailed discussion of the ideas that had previously emerged. Multiple attendees expressed the need for earlier and more involved internship opportunities. Greater adaptability was also discussed, observing that new graduates must understand and be prepared for more than the job at hand. Participants also observed that graduates must understand how to teach themselves to access and apply updated information, skills, and improved processes. Today's graduates must be prepared to enter a rapidly changing workforce by being both flexible and critical in their approaches to work, communication, and research.

The committee met on a regular basis to discuss the significant ideas that emerged from the sessions and to review ideas submitted online. Concurrently with the listening sessions, the

committee met regularly to analyze national trends and institutional data. A key component of these meetings was the analysis and discussion of data related to student success and ongoing university initiatives. The committee talked at length about meta-majors (a group of majors which share a set or sets of curricula) and the ways that college-specific degree pathways might ensure credit transfers between majors.

Examining Institutional Data

A variety of data sets were requested from University Planning and Analysis (UPA) and the Office of Assessment and Evaluation for review by the committee as ideas from the listening sessions took shape. The following information includes student majors and success data, supplemental instruction data, and data related to ULM's ongoing co-curricular initiatives that are relevant to the eventual choice of ULM's QEP topic. The first table contains information about the number and percentage of STEM and pre-health sciences majors. The second table spans five years and indicates the number and percentage of majors in each discipline and the percentage enrolled in BIOL 1014 or 1020.

Student Majors

In the subsequent numbers and tables, data is presented and discussed related to the number of majors in STEM and pre-health sciences. Analysis of student major declarations data found that between 2013 and 2017, approximately 61% of incoming freshmen declared a STEM

(atmospheric sciences, biology, computer science, kinesiology, mathematics, biology for secondary education, or toxicology) or pre-health sciences (allied health, nursing, or pharmacy) major. Thus, more than half of incoming freshmen declare a science or pre-health sciences major, which all require the same gateway biology classes. On average, more than 800 incoming freshmen in a single freshmen cohort enrolled or will enroll in Biology 1014 or Biology 1020. The table below provides details.

Section II Table B

First-Time, Full-Time Students with STEM and Pre-Health Sciences Majors					
Semester	**Number in First-Time, Full Time, Degree-Seeking Cohort***	**STEM and Pre-Health Sciences Majors**	**STEM Majors**	**Pre-Health Sciences Majors**	**Percentage of Cohort in Majors**
Fall 2013	1,318	814	313	501	62%
Fall 2014	1,222	738	271	467	60%
Fall 2015	1,376	809	322	487	59%
Fall 2016	1,343	829	321	508	62%
Fall 2017	1,340	852	292	560	64%
Average	1,319	808	304	505	61%

*Integrated Postsecondary Education Data System (IPEDS) Fall Enrollment Survey

As can be seen, these two biology courses serve a majority of the incoming student population, which could potentially indicate a logistically and strategically appropriate starting point for initiatives designed to improve student success and learning. Based on this information, the committee sought additional information on Biology 1014 and Biology 1020 and noted several areas of significance.

Student Success

First, the committee explored student success rates in the two courses. ULM uses a grading scale on which grades A, B, and C (ABC) represent successful completion; grades D, F, and W (DFW where W indicates withdrawal), represent unsuccessful completion. From 2012 through 2017, both biology courses had DFW rates between one-fourth to one-third as indicated in the table below.

Section II Table C

Fall 2012-Fall 2017 Course Success			
	ABC	**DFW**	**Percent Repeating Course**
BIOL 1014	67%	33%	14%
BIOL 1020	76%	24%	8%

During the five-year long period reported, 33.3% of the students did not succeed in Biology 1014, and 14% were repeating it, while 24% did not succeed in Biology 1020 and 8% were repeating it. This summary data does not specifically account for students who were successful the first time but were repeating to try to earn a higher passing grade than their first successful attempt nor does it include students who were unsuccessful and repeated one or more times in an attempt to complete successfully. Regardless of the reason for repeating the course, the data raises valid concerns: a large number of students do not complete the courses successfully, and only a small percentage of students who are not successful attempt the course again. Both issues potentially indicate a need for intervention in the courses to retain students and improve their success.

Supplemental Instruction (SI)

ULM's gateway biology courses (i.e. BIOL 1014 and 1020) as well as chemistry and physics have been categorized by the Student Success Center as "historically difficult" due to high numbers of students withdrawing or completing the courses with D or F. Since 2012, the Student Success Center has offered Supplemental Instruction (SI) to improve student success in these and other courses. Supplemental Instruction consists of assigning a student SI leader to each course section. An SI leader has taken the course in the past, completed with a high grade, and has been trained in group facilitation techniques. SI leaders attend each class period and hold regularly scheduled Supplemental Instruction sessions to review materials and share strategies for success.

Institutional data indicates that ULM students who opt to participate in Supplemental Instruction are more likely to succeed in these courses. The following two tables provide distinct Supplemental Instruction performance data for each section of BIOL 1014 and BIOL 1020 since fall 2012.

Section II Table D

Fall 2012- Fall 2017 Supplemental Instruction Data for BIOL 1014						
BIOL 1014 Section	**Section Enrollment**	**# Attending SI Session(s)**	**Percent of Attendance**	**Number of Sessions**	**SI Success Rate**	**Non-SI Success Rate**
Fall 2012						
1014-40098	150	78	52%	40	65%	44%
1014-40099	157	52	33%	41	54%	30%
Spring 2013						
1014-60110	165	51	31%	40	33%	31%
Fall 2013						
1014-40098	158	69	44%	33	68%	44%
1014-40099	161	43	27%	35	51%	45%
Spring 2014						
1014-60110	99	23	23%	38	70%	41%
Fall 2014						
1014-40100	170	40	24%	36	85%	66%
1014-43776	120	40	34%	34	80%	45%
Spring 2015						
1014-60110	172	42	24%	31	64%	43%
Fall 2015						
1014-43775	99	43	43%	40	95%	61%
1014-40100,	178	61	34%	37	92%	67%
Spring 2016						
1014-60110	150	49	33%	30	76%	44%
1014-63613	98	28	29%	36	79%	50%
Fall 2016						
1014-43775	106	39	37%	37	82%	63%
1014-40100	67	26	39%	37	77%	62%

1014-43776	109	51	47%	39	86%	59%
1014-44082	98	40	41%	41	82%	67%
Spring 2017						
1014-63613	74	22	30%	38	95%	58%
1014-60110	152	38	25%	39	74%	46%
Fall 2017						
1014-40099	96	52	54%	38	75%	37%
1014-40100	82	29	35%	38	62%	49%
1014-43775	108	61	56%	38	93%	83%
1014-43776	110	48	44%	39	85%	50%
1014-44082	88	44	50%	38	77%	51%

Since fall 2012 when ULM began offering Supplemental Instruction (SI) sessions for students enrolled in BIOL 1014, in all 24 course sections the success rates for students who attended at least one session are higher than those for students who did not; furthermore, the success rates for SI participating students were more than 20 percentage points higher than non-participants in 15 of the 24 course sections.

Section II Table E

Fall 2012- Fall 2017 Supplemental Instruction Data for BIOL 1020						
BIOL 1020 Section	**Section Enrollment**	**# Attending SI Session(s)**	**Percent of Attendance**	**Number of Sessions**	**SI Success Rate**	**Non-SI Success Rate**
Fall 2012						
1020-40113	147	41	27%	36	61%	63%
1020-40114	135	65	48%	40	66%	43%
Spring 2013						
1020-60134	143	38	27%	38	82%	79%
Fall 2013						
1020-40113	130	34	26%	36	65%	30%
Spring 2014						
1020-60135	173	26	15%	35	81%	80%

1020-60134	119	28	24%	36	57%	61%
Fall 2014						
1020-40114	55	10	18%	36	90%	80%
1020-43202	58	27	47%	35	67%	80%
1020-40113	179	52	29%	37	15%	34%
Spring 2015						
1020-60135	131	78	60%	34	21%	36%
1020-60134	103	34	33%	33	85%	81%
Fall 2015						
1020-43202	119	42	35%	39	90%	77%
1020-43879	103	37	36%	36	51%	52%
Spring 2016						
1020-60134	126	54	43%	38	91%	75%
1020-60135	122	44	36%	38	84%	71%
Fall 2016						
1020-43202	120	36	30%	39	56%	46%
1020-43879	110	34	31%	36	97%	74%
1020-40113	119	45	38%	39	80%	62%
Spring 2017						
1020-60134	126	42	33%	41	93%	76%
1020-60135	102	30	29%	40	97%	58%
Fall 2017						
1020-40113	110	47	43%	37	81%	68%
1020-43202	107	58	54%	36	67%	43%
1020-43879	119	34	29%	36	85%	80%

Since Supplemental Instruction offerings began for students enrolled in BIOL 1020, in 17 of the 23 course sections the success rates for students who attended at least one SI session are

higher than those for students who did not; furthermore, the success rates for SI participating students was more than 20 percentage points higher than non-participants in 5 course sections.

The data consistently shows that the majority of students who participate in SI have a higher success rate than their non-SI counterparts. While there are occasional anomalies, the students who attended SI were more successful in 41 of 47 course sections. These data suggest that more students can be successful if they are given the opportunity for additional and focused instruction. Since attendance at SI sessions is voluntary, on average only 36% of Biology 1014 and Biology 1020 students chose to participate in SI sessions.

Co-curricular Requirements for At-risk Students

Participation in Supplemental Instruction is voluntary for students enrolled in these biology courses. In 2015, however, ULM developed and implemented the first college English and Math courses that are mandatory for some students depending on their ACT score. Specifically, first-time freshmen entering with scores below ULM's ACT threshold of 19 for Math and 18 for English are required to participate in co-curricular instruction to increase their probability for success in these subsequent courses. As a result, students who scored either one point below the benchmarks in Math (18) or one or two points below the benchmark in English (16-17) are concurrently enrolled in both the credit-bearing entry-level course and the non-credit-bearing recitation course (i.e. ENGL 1001/ENGL 1000 and MATH 1009/MATH 1000). The goal of these co-curricular courses, whose course descriptions follow, is to facilitate success while keeping the students with their freshman cohort.

> **Math 1000 – Applied Algebra for College Students Recitation**
> *This course consists of instructor-supervised learning sessions designed to supplement course material for MATH 1009. This course provides small group sessions where students will study and work together. This course may not be used for University credit. Students will be awarded a grade of Credit or No Credit. Prerequisite(s): MATH ACT score 18 and concurrent enrollment in MATH 1009.*
>
> **English 1000 – Composition Recitation**
> *A recitation session to accompany ENGL 1001. Credit/No Credit. Not for degree credit. Prerequisite(s): English ACT of 16 or 17. Co-requisite: enrollment in ENGL 1001.*

Although the implementation and strategies for the two recitation courses are different, both seek to enhance and reinforce skills through additional contact hours and focused activities. Nevertheless, while both courses represent useful models for providing additional support, this document henceforth will focus only on the math course, as math is directly related to the science and health sciences fields associated with the QEP topic.

Math 1000 is taught by math faculty using a just-in-time tutoring model. At the first class meeting, students take a skills assessment through MyMathLab which generates a personalized student improvement plan. The course meets for one hour, twice per week. In addition to reviewing lectures, students work in small groups, complete additional assignments, and

participate in question and answer sessions. Students are also required to use ULM's Math Resource Center (MRC), a student-centered learning lab that requires active participation from students for one-on-one tutorials. Attendance in both class and the MRC is mandatory (see Appendix B for syllabi for 1000/1009).

Three years of data, from the inception of the course through fall 2017, demonstrate that this model for MATH 1000/1009 has been successful. Successful completion of MATH 1009 is defined as students who earn a grade of "C" or better. Analysis of the data indicates the co-curricular group (MATH 1000/1009) had a 70% success rate whereas the comparison group (MATH 1009) had a 56% success rate. This finding suggests that additional instruction hours have the potential to level the playing field for at-risk students. With the right combination of focused instruction and activities, the recitation courses appear to provide a clear advantage to students entering with borderline ACT subject scores, 70% of whom remain on track to graduate in four years in their cohort. The following table compares the two groups – those students who take MATH 1000/1009 and those who take only MATH 1009.

Section II Table F

MATH 1000/1009 Grades Versus 1009 Grades						
Fall 2015, Fall 2016, Fall 2017						
Grade	**MATH 1000/1009** (N=473)	**% Earning Grade**	**MATH 1009 Only** (N=556)	**% Earning Grade**	**Totals** (N=1029)	**% Earning Grade**
A	108	23%	98	18%	206	20%
B	119	25%	114	21%	233	23%
C	106	22%	101	18%	207	20%
D	40	8%	50	9%	90	9%
F	67	14%	91	16%	158	15%
W	33	7%	102	18%	135	13%
AB	227	48%	212	38%	439	43%
ABC	333	70%	313	56%	646	63%

The Supplemental Instruction and co-curricular requirement data suggest that student success can be improved through a focus on increased contact hours with faculty and trained peers. These findings, in conjunction with information about declared majors and retention in the major, began to reveal the direction for the QEP.

III. The FOCUS of the QEP

The QEP Planning Committee engaged in multiple discussions throughout the summer and fall of 2017 about the topics that were submitted to the website and those that emerged from the listening sessions. This information was compared to the institutional data and needs discussed in the previous pages. Using the ideas generated at the first listening session, key information from committee meetings, and analysis of the institutional data, the QEP Planning Committee expanded upon the initial idea categories of quantitative literacy, social literacy, metacognitive/ qualitative literacy, and inquiry/intellectual preparedness. Quantitative literacy refers to preparing students for analytical and critical problem-solving as well as financial and health literacies. Social literacy focuses on improving students' understanding of diversity, multiculturalism, and social justice. Metacognition and qualitative literacy represent the university's expanding awareness that classroom teaching must do more than simply address all learning styles. It must seek to teach students how to learn information and how to engage with other learners in a thoughtful and productive manner. Inquiry and intellectual preparedness focus heavily on essential skills, adaptation, and professionalism.

Sample Proposals

The QEP Planning Committee formed four subcommittees that were charged with creating highly detailed sample QEPs with the objective of developing the selected sample into ULM's QEP. After lengthy brainstorming and planning sessions, the four sample proposals were developed and presented to the whole committee for discussion.

Proposal 1 – "Connecting Academics to Real-World Experiences – The ePortfolio Project"
This six-year proposal focused on providing training to a cohort of 120-150 incoming pre-health sciences majors. The proposal emphasized effective communication, problem-solving, and connecting learning experiences to real-world applications. The academic experience would culminate in an ePortfolio, showcasing professional development and reflection.

Proposal 2 – "Hire Ed"
This proposal was designed to infuse each year of college with professional preparedness and would affect all majors and would include opportunities such as job shadowing; mentoring by upperclassmen, faculty, and community members; and instruction in professional etiquette, résumé writing, networking, and job interview skills.

Proposal 3 – "Meta-Majors Meets Metacognition"
This proposal sought to provide degree pathways for pre-health sciences majors and business majors by tracking them through key science, math, and quantitative methods courses. These key courses would be enhanced through the use of metacognitive strategies. This proposal used both writing and communications courses as well as career-based information to better prepare students majoring in these disciplines for their professional lives.

Proposal 4 – "Warhawk Wings – Prepare to Take Flight"
This proposal focused on increasing experiential learning opportunities and would be implemented throughout the four-year degree, beginning with University 1001 and the All-Majors Fair and progressing through targeted upper-level coursework.

All four of these proposals were presented to and discussed with the VPAA and the ULM Administrative Council.

Selecting the Proposal to Become the QEP

The proposals were emailed to all QEP Planning Committee members to review prior to each subcommittee presenting their proposal to the group. Following each presentation, the committee discussed the proposal. Proposals 1 and 4 were identified as moving in similar directions, so those options were combined into one proposal. At the end of October 2017, the QEP Planning Committee voted on the three proposals, electing to pursue the "Meta-Majors Meets Metacognition" option.

The "Meta-Majors Meets Metacognition" proposal was characterized as focusing on essential skills and competencies needed for academic and professional success including critical thinking, problem-solving, quantitative literacy, and communication through meta-majors (groups of majors with a set of courses in common). These essential skills and competencies could be assessed at pre-determined checkpoints through the shared curricula. The initial proposal was broad in nature, creating meta-majors in both life sciences and business while tracking students through their required biology and math/quantitative methods courses.

The goal of the "Meta-Majors Meets Metacognition" proposal was to improve student success in science and quantitative coursework by developing a wide-scale approach to critical thinking using metacognitive strategies. This proposal would involve a redesign of two science courses, Biology 1014 – Anatomy and Physiology and Biology 1020 – Principles of Biology. It would also involve the redesign of Math 1016 – Elementary Statistics and QMDS 2010 – Statistics and Quality Control. In addition, the proposal would also involve changes to one first-year writing course and a communications course (specific courses to be chosen) to introduce more creative approaches to problem-solving sooner in the student's college career. This proposal incorporated points from all aspects of the idea groups, designed to improve quantitative, qualitative, social, and professional skills while focusing on students majoring in life sciences and business.

In the weeks following the decision to adopt the metacognition proposal, the Planning Committee worked to articulate this proposal into a QEP. As the committee worked, the complexity and magnitude of the proposal in its initial form emerged and with it concerns that the proposal would not be manageable. This concern was confirmed when the committee chair attended the December 2017 SACSCOC Annual meeting in Dallas. During discussions with

other attendees and a SACSCOC VP, the chair was encouraged to narrow the focus of the proposal to make it more manageable, particularly in terms of implementation and assessment. The concern was that it would be difficult to implement and meaningfully assess. As a result of these suggestions, the committee decided to re-evaluate and revise the proposal to take a more targeted approach.

Narrowing the Focus

In response to the committee's concerns, which were confirmed by the chair's experiences and conversations at the SACSCOC Annual meeting, the committee began to analyze and re-evaluate the existing metacognition proposal to determine what should be discarded, what should be retained, and what needed to be adapted for a more effective and manageable proposal. To guide this re-evaluation, the committee again reveiwed the university's mission and vision statements. Since the vision statement articulates the university's focus on health sciences, this suggested that the first step in narrowing the proposal would be to concentrate on pre-health sciences majors and eliminate business majors. The committee also considered the concerns of the university's constituents (e.g. employers and community leaders), who had argued for a proposal rich in essential skills, particularly critical thinking, which is essential

across disciplines. This led to a generalized focus on critical thinking and metacognition in the sciences and pre-health sciences.

Once again, the group reviewed the student success data in gateway science courses (Biology 1014 and Biology 1020) for STEM and pre-health sciences majors. The data indicated that students who participated in the Supplemental Instruction sessions for BIOL 1014 and 1020 were more likely to succeed in these courses. This suggests that many students who struggle with these courses could improve and become successful when they are provided with additional focused instruction outside the classroom. As a result of these analyses and discussions, the committee determined that the two gateway biology courses required for STEM and pre-health sciences majors represented an ideal opportunity to impact student learning in those classes with the expectation that skills learned could prove applicable across multiple disciplines.

Each fall, of the more than 1000 incoming ULM freshmen, an average of 800 declare a STEM or pre-health sciences major. By redesigning these two gateway science courses, the committee believes that increased student learning would positively impact around 61% of the freshman class. The committee believes that investing resources to improve success in these courses through increased contact hours and the teaching of critical thinking skills is logical and strategic and addresses key issues aligned with institutional needs. Shifting the focus towards success through critical thinking can impact science retention, improve learning across the curriculum, and prepare students to navigate occupational changes. More specifically, a focus on improved critical thinking in gateway science courses can ultimately yield better learners, better thinkers, and better members of professional and civic communities.

With the development of a proposal with a clear purpose and more manageable implementation, the committee was ready to present its proposal to university administration. A one-page outline was presented to the Vice President and Associate Vice President for Academic Affairs in early November 2017. Subsequently, the VPAA facilitated the presentation of the document by the committee chair to the Deans' Council. Following Deans' Council approval, the proposal was presented by the committee chair to the President's Administrative Council which granted approval, allowing the committee to move forward with creating the actual QEP.

The QEP process began with a search for direction, but it culminated in a shared vision for the future. FOCUS on Biology will impact learning across disciplines while raising ULM's stature as a leading health sciences institution. This plan is a commitment to the university, to all students, and to the critical thinking skills necessary for success.

IV. FOCUS Goal and Outcomes

Overarching Goal

Following the identification and refinement of the topic, the committee had many discussions that ultimately gave rise to one overarching goal: to improve academic performance in the two gateway science courses that all STEM and pre-health sciences majors must take, Biology 1014 (BIOL 1014) and Biology 1020 (BIOL 1020).

ULM's strategy to achieve this goal is to redesign BIOL 1014 and BIOL 1020 courses to include an additional contact hour that integrates active learning strategies as the mechanism for improvement in critical thinking skills and competency with discipline-specific knowledge. These strategies include inquiry learning, peer learning, team learning, flipped classrooms, and metacognition. Course redesign will encourage student engagement in higher-order thinking.

QEP Goal

The overarching goal of the QEP will be to improve academic performance in gateway science courses. ULM will monitor two measures to assess the overall success of the QEP goal:

- Student success rates in BIOL 1014 and 1020
- Student success rates in subsequent science course

QEP Learning Objectives

The learning objectives for the QEP can be broken into two broad categories: critical thinking skills and discipline-specific knowledge. The student learning outcomes for critical thinking will align with those indicated by scores on the Critical Thinking Assessment Test (CAT). The QEP implementation committee developed a mnemonic to reflect the student learning outcomes for discipline-specific knoweldge: Formulate, Observe, Communicate, Use, and Synthesize. Together, these outcomes will demonstrate a development of critical thinking skills as well as content-specific knowledge.

Student Learning Outcomes for Critical Thinking (as defined by the CAT, (https://www.tntech.edu/cat/about/skills):

- Separate factual information from inferences
- Understand the limitations of correlational data
- Evaluate evidence and identify appropriate conclusions
- Identify alternative interpretations for data or observations
- Identify new information that supports/contradicts a hypothesis
- Explain how new information can change a problem
- Separate relevant information from irrelevant information
- Integrate information to solve problems
- Learn and apply new information
- Communicate ideas effectively

Student Learning Outcomes for Content Knowledge:

- **Formulate** a coherent understanding of the relationship between tissues, organs, and organ systems from a structural and functional perspective (BIOL 1014), and **Formulate** a coherent understanding of the characteristics of living things and describe how these are expressed at the cellular and sub-cellular level (BIOL 1020).
- **Observe** the natural world and explain the importance of the scientific method to understanding natural phenomenon (BIOL 1014/1020).
- **Communicate** anatomical terminology to identify and describe locations of major organs of each system studied (BIOL 1014), and articulate scientific data and ideas, including the use of written, oral, and electronic media to diverse audiences (BIOL 1020).
- **Use** the basic components of models and explain how models can be used to address biological questions and use appropriate information to solve biological problems (BIOL 1014/1020).
- **Synthesize** information to develop a conceptual understanding of biological processes and methods (BIOL 1014/1020), and **Synthesize** scientific data and information to develop hypotheses (BIOL 1020).

Additional Anticipated Impacts

FOCUS will be designed, implemented, and assessed for student success in freshman gateway biology courses. The project, however, is likely to result in additional positive impacts over the period of implementation and beyond:

- **Student success across disciplines**
  Students who complete FOCUS sessions prior to a change in major should also benefit from FOCUS in their new areas of study. Engaged learning, academic determination, metacognitive skills, communication skills, and critical thinking apply to collegiate success in any area of study. Also, success of FOCUS sessions as planned for BIOL 1014 and 1020 may result in expanding the additional hour strategy into other science courses.

- **Positive faculty influences**
  FOCUS will be a long-term, institutionally-supported intensive effort to deploy high-impact pedagogical practices. There is a strong likelihood that the impact from this program will extend beyond the biology program with indirect impact on other faculty and other courses in their disciplines. The success of FOCUS should stimulate faculty interest in pedagogical strategies while the university investment in FOCUS ensures resources will be available to faculty. Results of the FOCUS program assessments will be presented to faculty through ULM's Academic Innovation Center. The QEP may stimulate faculty interest in collaborating with FOCUS faculty to bring the learning strategies into other courses. It is anticipated that workshops and faculty training opportunities will be developed out of the FOCUS program.

V. Literature Review

The QEP Planning Committee's review of institutional data pointed to the need for improved student learning in ULM's gateway science courses, but a thorough understanding of why students struggle in these courses was needed in order to determine how to effectively address the situation. This literature review centers on ULM's exploration in two areas: student factors hindering success in post-secondary education and pedagogical strategies **to improve learning** in gateway STEM courses; essentially, why students struggle when they begin college and how best to improve their chances for success.

- **Student factors** focus on demographic dimensions and characteristics of students that contribute to students' capacity for academic performance and success. Challenges facing ULM students can include demographic information such as where they received primary and secondary education, their gender, or their status as an underrepresented racial minority. It can also include non-demographic phenomena such as overall preparation for the rigor of university courses. All of these factors can affect students' ability to be successful.

- **Pedagogy** examines how information is exchanged between learners and instructors in educational contexts; also known as teaching approaches. Active learning is one teaching approach and will be the strategy used in this QEP. Active learning refers to "any approach to instruction in which all students are asked to engage in the *learning* process" and "stands in contrast to 'traditional' modes of instruction in which students are passive recipients of knowledge from an expert" (Center for Educational Innovation, 2018). Student engagement in the learning process will occur as the result of curricular redesign and supplemental instruction, which are intended to enhance their learning experience and help improve their academic performance. Peer and near-peer mentoring represent additional ways to engage students in the learning process. Peer mentoring is collaboration between students from similar backgrounds including factors like age and major, or, in the case of the sciences, laboratory experience (Edgcomb, Crowe, Rice, Morris, Wolffe, & McConnaughay, 2010). Research suggests that peer mentors and near-peer mentors have potential benefits for novice students who need timely feedback or guidance. (Edgcomb et al., 2010).

These themes provide important theoretical, conceptual, and practical support for the selected QEP and why the Planning Committee selected this topic over others suggested by its constituents. It also provides rationale for the strategies and methods selected by the Implementation Committee.

Student Factors

Students have responsibilities and tasks in the learning process, and their ability to attend to those responsibilities and carry out the associated tasks influences their success.

This complex interplay of student-related factors can overlap and range from demographic characteristics (e.g., gender, race) to academic preparedness. These factors, along with their self-perception of skills and competence, their overall college experiences, and their reactions to those experiences, can also play a role in student success.

This section will address two primary areas: demographic characteristics, including vulnerable populations; and preparedness, which includes the roles high school curricula play and students' perceptions of their own skills.

Demographic characteristics

In its most recent report, the National Science Foundation stated, "enrollment in U.S. institutions of higher education in the United States at all levels has risen from 14.5 million students in the fall of 1996 to 21.3 million in the fall of 2011," and about 86% which is undergraduate enrollment (National Science Foundation, 2014). The National Science Board's 2008 report revealed an increase in the number of both male and female freshmen entering college with the intention to major in science (National Science Board, 2008); however, despite an increase in female and minority enrollment, male enrollment in science fields outpaces female enrollment in every racial category (Blickenstaff, 2005; National Science Board, 2008; National Science Foundation, 2014). This race and gender data is particularly important when viewed in the context of ULM enrollment demographics and achievement gaps in science outcomes.

While males typically dominate science field enrollment as described above, ULM enrolls 10% more females and 10% more African Americans than the national average (National Center for Educational Statistics, "Beginning Postsecondary Students" 2014 and "ULM: Enrollment 2017"). Both of these demographic categories manifest an achievement gap in secondary science outcomes. For example, 20% of U.S. twelfth grade students scored at or above "proficient" in science on the National Assessment of Educational Progress in 2015; however, the average score of African American students was 36 points below that of white students on a 300-point scale while females scored an average of five points lower than males (National Assessment of Educational Progress, 2015).

Additionally, nearly 90% of ULM's freshman enrollment consists of students from Louisiana. Louisiana students exhibit a significant achievement gap in science outcomes from their national counterparts. Thirty-three percent of the nation's eighth graders scored at or above "proficient" in science on the National Assessment of Educational Progress in 2015 compared to 22% of Louisiana's eighth graders (National Assessment of Educational Progress, 2015). While data is not yet available for Louisiana's twelfth grade students, the likelihood of an 11 percentage point eighth grade gap diminishing to the extent that it is no longer significant is improbable.

Considering that ULM's female, African American, and in-state student populations generally exhibit achievement gaps in secondary science outcomes, and that ULM enrolls more female and African American students than the national average, it is likely that the 60% of ULM

freshmen who declare majors in STEM or pre-health sciences fields will need additional resources to be successful.

Student preparedness

One of the most frequently cited challenges facing incoming freshmen students is whether they are prepared to deal with college. For this discussion, preparedness refers to students' academic preparedness or how prepared they are academically to handle the rigors of college coursework. The intention of most high school curricula is to be college preparatory in nature, but questions remain as to whether students are truly prepared for learning at a higher level (Chen and Soldner, 2013; Harackiewicz et al., 2016; Ramsey & Baethe, 2013; Sithole et al., 2017).

The achievement gaps discussed in the previous section occur at the high school level, with many underrepresented racial minorities coming from impoverished high schools (Harackiewicz et al., 2016; NSB, 2008).

In 2014, the National Science Board reported that many secondary schools place more emphasis on mathematics than the sciences. Several barriers to effective science instruction have been identified; these include inadequate funding for the purchase of appropriate equipment and resources and a lack of adequate science facilities (National Science Board, 2014). High School teachers also report that many students show little interest in mathematics and sciences; this seems unsurprising, given that teachers also report that they lack sufficient time to truly teach these topics meaningfully (National Science Board, 2014).

Additional evidence that could help explain these foundational problems can be attributed to prior academic challenges; "low student reading abilities" is cited as the most frequently occurring barrier to effective mathematics instruction (National Science Board, 2014, p. 1-6). This suggests that students are not developing the critical content mastery skills required to handle college-level coursework in the sciences or mathematics (Ramsey & Baethe, 2013). Without the necessary foundation from high school, students struggle with even the introductory courses once in college (Drew, 2011; Ramsey & Baethe, 2013). Surprisingly, a significant number of students who pursue STEM majors did not take advanced math courses beyond algebra II in high school, resulting in being underprepared for those courses that often are part of required coursework for science majors (Chen & Soldner, 2013; Ramsey & Baethe, 2013).

Students also lack certain skills which are necessary for college success and which could help them succeed with college-level coursework. Two of the key proficiencies for success, study skills and time management, overlap (Ramsey & Baethe, 2013). Studying and completing tasks and assignments within set deadlines requires time management, or the ability to manage tasks in a given time period. Thirty-two percent of students in the 2018 Noel-Levitz report confirmed that their study habits were "very irregular and unpredictable" (p.4). The same report revealed that 7 out of 10 of incoming freshmen report wanting assistance to improve their study skills (Noel-Levitz, 2018).

Sithole et al. (2017) noted that many science courses require more study time than other academic disciplines due to laboratory course requirements. Incoming freshmen may not realize the extra work required to successfully complete science courses, and therefore struggle to balance time required to complete assignments in both science and non-science courses. Furthermore, students often develop significant anxiety when faced with intense course loads. They struggle to find the time necessary to prepare for class and study for tests so they can do well in the course (Sansgiry & Sail, 2006). Addressing these issues is critical to improving academic performance.

Pedagogy

Pedagogy is the fundamental opportunity for universities to engage students and to facilitate learning, particularly in active and experiential learning. Sithole et al. (2017) observed that "education and learning are dynamic processes," and that while facts may be stationary, "knowledge itself is not static" (p. 49). Furthermore, "knowledge changes according to changes in the wider society and according to the tools available to a given people" (Sithole et al., 2017, p. 49). Thus, students can only excel to the degree that their learning environments and the methods used to create those environments acknowledge these contextual facets of the learning process.

Additionally, as knowledge changes, pedagogical approaches used to communicate that knowledge must occur. Sithole et al. (2017) characterized the importance of the pedagogical adjustment: "Education is a service activity and must, therefore, be responsive to the changing needs of its clientele" (p. 50). The authors observed that "several pedagogical approaches have been devised to motivate students to learn science" and that organizations like the National Science Foundation and the National Academy of Sciences have pursued instruction reform for several STEM disciplines (Sithole et al., 2017, p. 50).

Chalmers (2013) indicated that course reform and review is continuous but that research measuring the effectiveness of reform and review has not necessarily reflected the integration of these efforts into daily classroom activities. There are three vital themes related to science teaching/learning outcomes: problem-solving; scientific reasoning; and the necessity of evidence to validate claims (Chalmers, 2013). Majoring in scientific disciplines helps students develop problem-solving, logical and scientific reasoning, and quantitative reasoning skills, all of which reflect the focus of science teaching/learning (Sithole et al., 2017).

Active Learning

According to Suchman (2014), faculty who successfully create active learning classrooms help to improve student outcomes (Suchman, 2014). Active learning is not a new concept and is not, pedagogically speaking, the purview of any particular discipline; any discipline can employ this approach. In 2016, The Center for Research on Learning and Teaching at the University of Michigan offered the following definition for active learning: "any instructional method that engages students in the learning process. In short, active learning requires students to do meaningful learning activities and think about what they are doing." This definition implies that

active learning encompasses a wide variety of activities and approaches, which accounts for its applicability across multiple disciplines. It also has bearing on positive approaches to teaching science courses, as research suggests it can improve outcomes, especially over the traditional lecture format (Freeman, Eddy, McDonough, Smith, Okoroafor, Jordt, & Wenderoth, 2014).

Teaching Sequence

For purposes of this discussion, teaching sequence does not refer to the order in which courses are taught but refers to the actual order of the teaching methods used in class when providing instruction.

Researchers Veselinovska, Gudeva, and Djokic (2011) proposed that the order in which a faculty member uses certain methods could affect students' understanding of the material and therefore influence students' outcomes. The authors tested this hypothesis when teaching a unit on proteins in a biology course. Three methods common to the biology classroom were used: lecture, slide presentation, and laboratory method/student experience, all of which represent traditional teaching methods for biology (Camfield & Land, 2017; Freeman, et al., 2014; NSB, 2014; Sithole et al., 2017; Vaughan, 2010; Veselinovska, Gudeva, & Djokic, 2011). The three methods were rearranged to determine which sequential combination was the most effective. Three groups were formed: Group I would receive the laboratory-lecture-slides arrangement; Group II would receive the lecture-slides-laboratory arrangement; and Group III would receive the slides-laboratory-lecture (Veselinovska, Gudeva, & Djokic, 2011).

The authors found that the students in groups that began with the laboratory method or slide demonstration (Group I and Group III respectively) performed better academically than their peers whose lesson began with the lecture (Group II). The authors observed that when teaching science, the laboratory method/student experiment or slide demonstration at the outset seemed to attract the attention and inspire the motivation of the students (Veselinovska, Gudeva, & Djokic, 2011). In contrast, students whose lesson began with the traditional oral lecture method seemed to lose interest and motivation, a finding which would be confirmed later in the work of Freeman et al. (2014). This static, passive experience is far less stimulating than the laboratory setting which the authors assert is "a more conducive learning environment" which offers students hands-on learning experiences (Veselinovska, Gudeva, & Djokic, 2011, p. 2527). The authors also argued that the effective arrangements wherein slides and laboratory preceded lecture engaged students more, giving them more hands-on experiences and more opportunities for active thinking, learning, and knowledge reflection (Veselinovska, Gudeva, & Djokic, 2011), all of which represent active learning practices.

It should also be noted, given the emphasis on pedagogy, that the relationship between student and instructor is critical. Faculty-student interactions facilitate the students' social integration into the university, which is crucial for academic success (Mellor et al., 2015). If students do not feel welcomed or a sufficiently oriented to their college, they are less likely to develop institutional commitment, which can affect their intention to remain in school, and do well in their courses (Mellor et al., 2015).

Continued Opportunities for Faculty Exposure to Active Learning Strategies

One of the key elements that several of the previously-described methods offer as a selling point is that they do not require special training on the part of the faculty or instructors involved in the course. Shifting the order of one's approach to presenting materials does genuinely seem like easy, low/no cost ways of redesigning courses. Furthermore, implementing such approaches seems easy, assuming faculty buy-in. The extra grading required by the active learning strategies are a concern of Land in a study he conducted with Camfield. Researchers acknowledged that getting biology faculty to shift from their traditional methods of instruction could be difficult. It is therefore important, the authors note, to provide faculty with opportunities to learn new strategies when implementing new methods or redesigning courses (Camfield & Land, 2017). This is no less important when adding new active learning assignments to existing courses. Simply put, change can be scary; faculty are often content experts *not* pedagogical experts.

Active learning can thrive only when faculty truly understand what it is and how to integrate it meaningfully into their courses, even if that means making a minimal modification to add active learning activities. This process requires that faculty assigned to such courses have adequate access to opportunities to learn more, which ULM's QEP is intended to ensure.

Course Redesign

One method for improving academic performance is by enhancing student engagement (Vaughan, 2010), and one of the primary ways of enhancing student engagement is through course redesign (Camfield & Land, 2017; Twigg, 2005). As active learning encompasses a wide variety of approaches and can be adapted for any classroom regardless of discipline, it can form the foundation for reconfiguring courses to enhance student learning.

In certain situations, course redesign emerges as an ideal solution. Some scholars tout it as a low-cost or cost-effective solution that enhances learning; that is, low investment with high yield (Camfield & Land, 2017; Haak, HilleRisLambers, Pitre, & Freeman, 2011; Twigg, 2005). There is also evidence that simply using a variety of methods in a single course or reconsidering the sequence in which methods are used makes a difference in student outcomes (Veselinovska, Gudeva, & Djokic, 2011). Therefore, course redesign offers the university the means by which to reconsider how it is teaching its students, identify active learning methods that might be more effective, and introduce ways to strategically improve student learning outcomes.

Structure, Underrepresented Racial Minorities, and No-Cost

The development of specific courses and the resources involved in establishing special research laboratory experiences and active learning classrooms may be beyond the financial capital of some universities. Haak et al. (2011) sought a course redesign solution that could be accomplished without increasing funding or necessitating the hiring of additional faculty. They also sought to pay particular attention to underrepresented racial minorities in their redesign. Haak et al.'s (2011) course redesign plan involved increasing the amount of structure within the curriculum and purposefully incorporating active learning approaches. While the details of such development were not explored in-depth in the study, an outline of the course was presented.

The course is characterized as being “based on daily and weekly practice with problem-solving, data analysis, and other high-order cognitive skills” which they found “improved the performance of all students in a college-level introductory biology class” (Haak et al., 2011, p. 1213). Additionally, this approach also increased parity between achievement levels of traditional and disadvantaged students, all without increasing use of resources (Haak et al., 2011). The authors characterized their findings as supporting the Carnegie Hall hypothesis; that is, “intensive practice, via active-learning exercises” can help “capable but poorly prepared students” regardless of their advantaged/disadvantaged status (Haak et al., 2011, p. 1213).

Peer and Near-Peer Mentoring

Smith (1993) recognized that student learning and student learning outcomes can be significantly affected by what she terms the *implicit curriculum.* This implicit curriculum involves the pedagogy, values, culture of a place, “and, most importantly” the interactions between students and faculty (Smith, 1993). This suggests that social aspects of the teaching/learning experience should not be overlooked.

Camfield and Land (2017) described an active learning approach in the writing process that incorporates peer review. After writing their proposed thesis statements for their wrap assignments, the students would review one another’s statements and provide constructive feedback (Camfield & Land, 2017). The professor allowed class time to carry out these reviews and encouraged the students to analyze the breadth, depth, and relevance of their classmates’ work and not to be afraid to be critical (Camfield & Land, 2017). Students reported greatly appreciating the peer-review process. Students valued the feedback from their classmates, indicating their understanding of how the reviews improved the students’ communication of key ideas (Camfield & Land, 2017). The authors interpreted this positive reaction as signaling “student readiness for participation in collaborative forms of doing science” (Camfield & Land, 2017, p. 23).

Peer-based learning processes can also take the form of peer mentoring and/or near-peer mentoring. Peer mentoring occurs when students with similar backgrounds work together. Near-peer mentoring is similar, though there may be significant differences between the students, for example, a graduate student helping an undergraduate or even secondary student. Research suggests that peer mentors and near-peer mentors have potential benefits for research students, including the establishment of a larger network of collaborators, particularly when novice students need timely feedback or guidance (Edgcomb et al., 2010). Some researchers even contend that peer mentoring or teaching “may have an even greater impact on students” than classroom teaching (Colvin & Ashman, 2010, p. 121). ULM has already employed peer mentoring in its English and math co-curricular course requirement for students demonstrating the need for additional resources; thus, there is precedence for the success of this approach at ULM.

Related to, but slightly different from, peer mentoring, is peer tutoring. Peer tutoring falls under the category of supplemental instruction and occurs when a more advanced student helps a lower-level student with course content (Colvin & Ashman, 2010). Peer tutoring is common in

higher education and often represents a key academic support resource for students struggling with course content or concepts. As Colvin and Ashman (2010) noted, however, there is research that indicates that students, faculty, and tutors do not always understand what constitutes tutoring, what the tutor's role should be, and that students and faculty have been known to resist tutoring and tutors themselves. This suggests that while tutoring can be very helpful, either as an active learning technique or as supplemental instruction, there are risks involved. Furthermore, it appears that peer tutoring, and perhaps even peer mentoring, should not be viewed as stand-alone solutions to improving academic performance and student outcomes, but should rather be one option of several that are available to students.

Learning Communities

Another form of social learning is the learning community. The use of learning communities has become "ubiquitous in American higher education" and is often defined as "a variety of curricular approaches that intentionally link or cluster two or more courses, often around an interdisciplinary theme or problem, and enroll a common cohort of students" (Otto, Evins, Boyer-Pennington, & Brinthaupt, 2015, p. 2). Although ULM's FOCUS sessions will be a structural part of the BIOL 1014 or 1020 courses (a fourth contact hour of a three credit hour class), they will be logistically separate as students will attend the FOCUS session at a different time and location during the week. Otto et al (2015) discussed five attributes of successful learning communities: community, diversity, integration, active learning, and reflection and assessment. FOCUS sessions will "create safe spaces for all students to interact more closely with teachers and with fellow students" (Otto, Evins, Boyer-Pennington, & Brinthaupt, 2015, p. 9) to develop the benefits of a true learning community.

Higher education researchers have described learning communities as having positive effects on student outcomes and are regarded as one of ten high-impact practices according to George Kuh (Otto et al., 2015), a scholar of improvement practices in higher education, student engagement, assessment strategies, and campus cultures. Students who participate in learning communities demonstrate "enhanced academic performance, integration of academic and social experiences, gains in multiple areas of skill, competence, and knowledge, and overall satisfaction with the college experience" (Otto et al., 2015, p. 2). Even students who participated in a learning community early in their college experience, found the benefits persisted through to their senior year (Otto et al., 2015).

Smith (1993; 2001) related how early in the history of the development of learning communities, the concept of active learning was introduced. Smith (1993; 2001) also noted that through the history of learning communities, themes such as access, democracy, and classrooms as community have not just repeated but also stand out. Additionally, the notion of the learning community has increasingly placed emphasis on active learning and "a curricular structure that builds deep engagement for both students and faculty" (Smith, 2001, p. 6). These concepts exhibit similarity to some of the elements that are thought to inspire and motivate student engagement and therefore retention. This suggests that well-structured, active learning integrated learning communities could be a meaningful solution for course redesign. The university has implemented successful learning communities in the past, and the

implementation of the FOCUS session hour would essentially create a two-course learning community for each of ULM's STEM and pre-health sciences gateway biology courses, BIOL 1014 and BIOL1020, centered on the inclusion of active learning strategies in the additional hour.

Summary

Considering the demographics and preparedness of ULM students in gateway science courses, the application of deliberate pedagogical approaches (e.g. active learning) and the use of social learning opportunities (e.g. peer and near-peer mentoring) can enhance student learning. Implementing an additional contact hour structured around proven pedagogies will address ULM's specific student factors and learning challenges.

VI. Actions to Be Implemented

The overarching goal of *FOCUS on Biology* is to improve performance and success of STEM and pre-health sciences freshmen students in two gateway biology courses: BIOL 1014 (Fundamentals of Anatomy and Physiology I) and BIOL 1020 (Principles of Biology I). The QEP seeks to implement an innovative strategy focused on improving student learning through increased exposure to content-specific knowledge, development of critical thinking skills and use of high impact active learning strategies. Implementation of the QEP will be carried out with the involvement of constituencies including students, faculty, and staff. These constituencies will be involved with the collection of quantitative and qualitative data, informed with yearly progress reports, and engaged in the improvements and modifications to the plan. Using high-impact practices in the pursuit of this goal aligns with a key component of ULM's **mission** which is to prepare students to "compete, succeed, and contribute in an ever-changing global society through a transformative education." Embedding initiatives in two gateway biology courses required for STEM and pre-health sciences students aligns with ULM's institutional **vision** to be recognized for "excellence in teaching, research, and innovation, with an emphasis on the health sciences." A significant part of ULM's student population, more than 61% as entering freshmen, seek careers in the sciences and health sciences, thus making life sciences an important focus of ULM's STEM initiatives. As such, ULM's QEP proposal is *FOCUS on Biology* wherein students will have an opportunity to:

Formulate
Observe
Communicate
Use
Synthesize

The *FOCUS on Biology* proposal centers on the creation and implementation of an additional hour (FOCUS session) to be added to freshman biology courses with activities that:

- Focus on critical thinking
- Focus on content learning and retention

Focus sessions will be an instructional enhancement applied to two introductory gateway biology courses:

- BIOL 1014 - Fundamentals of Anatomy and Physiology I, the gateway biology course for pre-allied health sciences majors including pre-dental hygiene, two health studies programs, kinesiology, pre-nursing, pre-occupational therapy assistant, and pre-radiologic technology; and
- BIOL 1020 - Principles of Biology I, the gateway biology course for STEM majors including atmospheric sciences, biology, computer science, math, pre-medical laboratory science, pre-pharmacy, secondary education - biology concentration, and toxicology.

FOCUS sessions will be integrated into all sections of these courses and will be designed by a recently hired biology faculty member who also serves as the QEP Coordinator. Although BIOL 1014 and 1020 will remain 3 credit hour courses, the FOCUS session will be taught as a fourth class hour during the week to enhance content understanding and application through active learning strategies used to develop students' critical thinking skills and discipline-specific knowledge. FOCUS sessions will enhance the environment of student learning to promote the mission and vison of the university.

The following are the Course Descriptions from the 2018-2019 Course Catalog (see Appendix C for syllabi):

> *BIOL 1014: Fundamentals of Anatomy and Physiology I*
> *Course Catalog Description: Introduction to anatomy and physiology, including cells, tissues, organs, and the integumentary, skeletal, muscular, and nervous systems. Non-majors only. (3 credit hours)*
>
> *BIOL 1020: Principles of Biology I*
> *Course Catalog Description: A course designed for those students majoring in a science-related field. Course content deals with scientific methodology, DNA and the genetic code, cell structure and cell development. (3 credit hours)*

Course Design and Implementation

Student success in STEM disciplines has been researched extensively, and several high-impact practices have emerged from these studies. In particular, overwhelming evidence has demonstrated the efficacy of active learning strategies in both small and large groups of students (Freeman et al, 2014; Deslauriers et al, 2011). As previously described, the use of supplemental instruction and course recitations has proven successful at ULM for both Math and English courses. Increased content understanding and improved critical thinking will be important outcomes of the high impact practices proposed below. The use of recitation sections is increasingly being recommended for retention and student success by organizations such as Complete College America. While recitation sessions are often offered as a separate co-requisite course, in this QEP the FOCUS sessions will be a fourth hour of class meeting during the week and will be taught by a different instructor.

While traditional recitations sections are often tied to homework or solutions to the homework where students are generally passive, the FOCUS sessions aim to make the student an active learner, to enhance critical thinking, and to impart metacognitive skills. It is intended that the didactic lectures for each course will remain the same with the content delivery at the sole discretion of the instructor. The weekly one-hour long FOCUS sessions will be directed and taught by the QEP coordinator in a student-centered environment in which critical and analytical thinking will be addressed by integrating broader biological themes within each session. Cooperative problem solving, case studies, discussions, and tutorials that link concepts will be used.

High-Impact Practices

The FOCUS sessions will use teaching and learning techniques that have been shown in the research literature to be high-impact best practices. While both are considered gateway science courses, BIOL 1014 and BIOL 1020 have very different course objectives. BIOL 1014 (and its subsequent course BIOL 1015, and associated labs) is designed to teach the foundations of human anatomy and physiology necessary for students pursuing careers in nursing, physical therapy, occupational therapy, radiologic technology, and other health sciences fields. BIOL 1014 is not considered a majors-level course for biology majors, but it can be used to satisfy the natural science requirement in the core curriculum. BIOL 1020 is the freshman majors-level introductory biology course. This course is taken by all STEM majors at ULM, including computer science, mathematics, atmospheric science, and chemistry majors. Students who are in the pre-pharmacy program are also required to take BIOL 1020 their freshman year. Most entering biology majors at ULM have an interest in a pre-medical curriculum (e.g. pre-dental medicine, pre-physician's assistant, pre-veterinary medicine, pre-podiatry, and pre-optometry).

FOCUS sessions will incorporate activities focused on content understanding and retention, as well as activities that promote application of the material and critical thinking. Since the two gateway science courses are so different and target different student populations, the FOCUS sessions will be designed to meet these specialized educational objectives. For example, BIOL 1014 FOCUS activities will be geared toward understanding the human body as an integrated and regulated physiological system and developing the ability to predict how perturbations in one specialized system impacts other systems and the human body as a whole. BIOL 1020 will emphasize experimental thinking and application of the scientific method with an emphasis on how the scientific method was used to generate the information they are learning. It is also important for the BIOL 1020 FOCUS sessions to further develop quantitative thinking, an ability critical to success in STEM fields. Thus, applications and solutions using a quantitative approach, as well as data analysis, will be emphasized for BIOL 1020. Both BIOL 1014 and BIOL 1020 will use the development and analysis of models as an important learning tool.

One challenge to implementing FOCUS is the large class sizes for the lectures (typically exceeding 100 students/section). Since active learning is often used with small groups of students, FOCUS will use large lecture active learning modules as well as occasional activities involving smaller groups. Graduate teaching assistants will assist the QEP Coordinator in leading group activities. While, each section of BIOL 1014 and BIOL 1020 will have a FOCUS session every week, group activities can be planned and staggered to give adequate time for preparation and training. One or two peer mentors per section will also be trained and compensated to help facilitate the active learning strategies in the FOCUS sessions. These peer mentors will be individuals who have successfully completed the course. Starting in Fall 2020 for BIOL 1020 and Spring 2021 for BIOL 1014, the peer mentors will ideally be individuals who have successfully completed the re-designed course that includes the FOCUS sessions. The QEP coordinator will develop the precise FOCUS session curricula, including appropriate high-impact practices, with input from the QEP Steering Committee and BIOL 1014 and BIOL 1020

instructors. The curricula will incorporate the use of peer mentors to facilitate some of the active learning activities; thus providing added benefit, similar to the success of ULM's already implemented SI program. Numerous high-impact practices are also being considered for use.

Process-Oriented Guided Inquiry Learning

Process-oriented guided inquiry learning (Brown, 2010) centers on a three-stage learning cycle which first takes into account students' existing knowledge and misconceptions. Models such as data and graphs are then used in conjunction with guided-inquiry to enable students to facilitate understanding of concepts. Students are then given the opportunity to apply these new concepts to a problem. Efforts are also made to focus on students' abilities to manage time and resources, retrieve and process information, and think critically. This strategy will allow students to *Observe*, *Use*, and *Synthesize*.

Peer-Led Team Learning

Within the FOCUS framework, BIOL 1014 and BIOL 1020 students need to engage in activities that will enhance their understanding and retention of the material (*Formulate* and *Communicate*) and promote critical thinking through analysis and application (*Observe*, *Use*, and *Synthesize*). The framework for FOCUS will be similar to one used by the University of Southern Indiana for an Anatomy and Physiology supplemental course to accompany the lecture course (Hopper, 2011). For FOCUS sessions that will involve breaking the lecture class into small groups to work on guided activities, ULM will use a variation of the Peer-Led Team Learning model (Finn & Campisi, 2015). In Peer-Led Team Learning, undergraduate students who have been successful in the course serve as group session peer-leaders, along with an instructor or graduate assistant. This is similar to the Supplemental Instruction program that ULM already uses for several freshman courses, typically BIOL 1014, BIOL 1015, BIOL 1020, CHEM 1001, CHEM 1007, CHEM 1008, PHYS 2003, and PHYS 2004. The difference is that the FOCUS Peer-Led Team Learning will be mandatory and will be guided and closely monitored by the QEP Coordinator. Activities will involve collaborative responses to questions, use of interactive websites, and discussion of case studies and scientific experiments. These activities will give students the opportunity to *Formulate* and *Communicate*, and should lead to better understanding of the material, subsequently improving performance in the course.

Flipped Classrooms

The use of flipped classrooms is another high-impact practice supported by research evidence (Styers et al, 2018). In the flipped classroom model, students prepare for class with videos and assigned readings, and in-class time focuses on active learning strategies. The use of a flipped classroom could be incorporated as part of the Peer-Led Team Learning and Process-oriented guided inquiry learning, or could be used as a large lecture class activity, either in the FOCUS session or in the normal lecture sessions. "On the spot feedback" technology, think-pair-share, along with learning cycles that involve **engagement, exploration, explanation, elaboration, and evaluation** are active learning strategies commonly used in the flipped classroom and are amenable to large lectures.

Metacognition

Metacognition is the monitoring of one's own cognitive process as it relates to learning. Metacognitive skills can be taught explicitly to students with an overall goal of generating metacognitive culture in the classroom. Many metacognitive strategies are described in the published literature. One approach is to make students aware of Bloom's taxonomy with the goal of helping students identify which level of Bloom's taxonomy they are operating within (Cook et al., 2013). Metacognitive skills can be used by students to identify gaps in their knowledge and deficiencies in their ability to solve problems. Parker Sibert et al. (2011) developed a highly effective "problem manipulation method" where students were given a pre-class problem and determined what the problem is asking for using the terminology from Bloom's taxonomy. Students then wrote their proposed strategy for solving the problem and identified the concepts that were being used. To further encourage metacognition, students created a new problem based on the same concepts of the original problem. The use of "wrappers" is another common metacognitive strategy (Poorman et al., 2016). This activity can be implemented within existing homework assignments, lectures, or exams. Within homework wrappers, students are expected to prioritize information. Lecture wrappers teach students to identify the lecturer's most important points and the use of lecture wrappers improves students' abilities to identify the same key points as the instructor. Planning, monitoring, and evaluating one's own learning process improves thinking skills and academic success (Tanner, 2012).

FOCUS session leaders will invite students to reflect on their metacognitive abilities by taking a personal assessment. The Metacognitive Awareness Inventory is a comprehensive tool that uses a Likert-scale to determine students' awareness of the cognition of knowledge and the regulation of cognition (Schraw & Dennison, 1994). These two distinct areas help students to become aware of how they learn. Identifying the knowledge associated with cognition allows students to identify declarative, procedural, and conditional knowledge. These areas focus on factual knowledge and its application. The second part of the Metacognitive Awareness Inventory, regulation of cognition, measures a students' ability to plan, monitor their comprehension, manage skills, and evaluate performance.

Exercises in metacognition will be used to complement and reinforce factual learning. For example, exam wrappers will be given in the FOCUS sessions after each formative assessment within BIOL 1020 and BIOL 1014. Exam wrappers are designed for students to reflect on their preparation and performance on an exam to inspire changes for future assessments (Gezer-Templeton et al., 2017). An example of a biology exam wrapper currently used at ULM can be found in Appendix D.

Other Examples of High-impact Practices at ULM

ULM has a history of implementing high-impact practices to improve student success and learning. In an effort to promote faculty-student interaction, ULM provides undergraduate research opportunities. Emerging Scholars is an institution-wide program where first and second year students work closely with a faculty member on a research project or other activity. The University hosts an annual Student Research Symposium where undergraduate and graduate students present research conducted over the past year. Funding from Howard Hughes Medical Institute and National Institutes of Health have supported undergraduate research experiences in the Biology program since the early 2000s. In 2008, ULM became a first cohort institution in the nationwide (and now international) SEA-PHAGES program. In this program, freshman biology students engage in research experience through the isolation, characterization, and genomic analysis of novel bacteriophage. Assessment of this program has demonstrated significant learning gains for participating students (Hanauer et al., 2017; Jordan et al., 2014). The Biology program is currently testing a Course-embedded Undergraduate Research Experience (CURE) for its Principles of Biology Lab (BIOL 1021) as a way to identify new lab activities that better develop analytical and quantitative thinking. Finally, ULM has implemented Supplemental Instruction, a form of peer-led learning, into its introductory science courses. Internal data has shown that students who choose to participate in Supplemental Instruction sessions perform better than students who do not take advantage of this opportunity.

VII. Assessing the Plan

FOCUS on Biology, a five-year long integrated instructional enhancement initiative, is designed to target cognitive and critical thinking skills in two gateway biology courses. The effectiveness of the FOCUS sessions will be measured through an assessment process with a variety of instruments. The assessment instruments to be administered to students enrolled in BIOL 1014 and 1020 include a nationally developed test to measure critical thinking and real-world problem solving, two locally developed diagnostic assessments to measure content specific knowledge, a national survey of student engagement to measure perceived development of critical thinking skills, pass-rates of FOCUS-linked courses, and longitudinal tracking of student performance in their subsequent science course (whether it is BIOL or another science discipline). The QEP goals will be measured by data provided by University Data and Analysis including the grades of the students in the FOCUS course and their subsequent science course with a target of 75% of students enrolled in a FOCUS-linked course earning an A, B, or C, and 85% of those successful students earning an A, B, or C in their subsequent science course. The student learning outcomes for critical thinking are skills directly reflected by scores on the CAT test. The locally developed embedded diagnostic questions will be incorporated as part of the final exam in all sections of BIOL 1014 and BIOL 1020, one set of questions for each course. The set of embedded questions as a whole will be analyzed with a target of 75% of the students in the course will be able to answer 75% of the questions correctly. An item analysis will also be conducted on the questions. This analysis will be used to analyze what areas may be weaker than others, determine what questions need to be re-written, learn which Student Learning Outcomes for content-based knowledge need to be emphasized, and confirm the best questions to asses each Student Learning Outcome. Alignment of these measures with our QEP goals and Learning Objectives is provided in the table below.

Section VII Table A

QEP Goal	Measure	Target
Success in FOCUS course	Grade in BIOL 1014 or BIOL 1020 Class	75% of students enrolled in a FOCUS-linked course will earn ABC
Success in subsequent science course	Grade in subsequent science course	85% of students who received ABC in FOCUS-linked course will receive ABC in subsequent course

Section VII Table B

Learning Objectives	Student Learning Outcomes	Measure	Target
Critical Thinking	• Separate factual information from inferences • Understand the limitations of correlational data • Evaluate evidence and identify appropriate conclusions • Identify alternative interpretations for data or observations • Identify new information that supports/contradicts a hypothesis • Explain how new information can change a problem • Separate relevant information from irrelevant information • Integrate information to solve problems • Learn and apply new information • Communicate ideas effectively	CAT Test	Scores improve for years 2020, 2021, and 2022
Content Knowledge	• Formulate a coherent understanding of the relationship between tissues, organs, and organ systems (BIOL 1014) • Formulate a coherent understanding of the characteristics of living things (BIOL 1020) • Observe the natural world and explain the importance of the scientific method (BIOL 1014/1020) • Communicate anatomical terminology (BIOL 1014) • Use the basic components of models (BIOL 1014/BIOL 1020) • Synthesize information to develop a conceptual understanding of biological processes (BIOL 1014/BIOL 1020) • Synthesize scientific data and information to develop hypotheses. (BIOL 1020)	Locally Developed embedded Diagnostic Questions	75% answer 75% correctly

Critical Thinking Assessment Test (CAT)

To assess critical thinking, ULM will employ both a direct and indirect measure of student learning. A nationally standardized instrument developed by Tennessee Technological University (Stein et al., 2010) will be used to directly measure critical thinking skills. The Critical thinking Assessment Test (CAT) is a 15-question, short response instrument designed to estimate higher-order thinking skills for evaluating information, creative thinking, learning and problem solving, and communication. The questions reflect real-world situations and real-world data. The CAT can quantitatively determine student strengths and weaknesses when solving problems and thus reveal the students' ability to think critically.

Skill Areas of the CAT (https://www.tntech.edu/cat/about/skills)

- *Separate factual information from inferences*
- *Interpret numerical relationships in graphs*
- *Understand the limitations of correlational data*
- *Evaluate evidence and identify inappropriate conclusions*
- *Identify alternative interpretations for data or observations*
- *Identify new information that might support or contradict a hypothesis*
- *Explain how new information can change a problem*
- *Separate relevant from irrelevant information*
- *Integrate information to solve problems*
- *Learn and apply new information*
- *Use mathematical skills to solve real-world problems*
- *Communicate ideas effectively*

Although the CAT imposes no time limits, students typically complete the exam in 40 minutes. Psychometric properties available on the website listed above include:

- Internal consistency - 0.7
- Inter-rater reliability - 0.92
- Test-retest reliability > 0.8
- Culture fairness
- No ceiling or floor effects
- Face validity
- Concurrent validity with ACT, SAT, California Critical Thinking Test
- Discriminant validity against NSSE item – time spent memorizing facts

The CAT will be administered during the final FOCUS session to a statistically significant number of students selected at random from each course section. The students who do not participate in the CAT test will be given a locally developed computerized crtical thinking test.

National Survey of Student Engagement (NSSE)

The National Survey of Student Engagement (NSSE) is administered by ULM to freshmen and senior undergraduate students in even years. The NSSE results give an indication of how students spend their time and their perception of what they are gaining from attending ULM. The survey is broken into four broad themes, called engagement indicators, that address academics, campus environment, peer learning, and faculty interactions. Subsets of NSSE items include questions focused on higher-order learning and reflective and integrative learning. Additionally, NSSE asks students to rate their institution's contribution to personal development in critical thinking skills.

Locally developed Diagnostic Questions

Locally developed diagnostic questions will be used to measure content knowledge within each course. The diagnostic questions are course specific, exam embedded questions that highlight essential knowledge from the course. The questions cover both specific content and prerequisite knowledge that students need to be successful in the course and able to recall in subsequent courses. These questions will be piloted during Spring 2019 and Fall 2019 to collect baseline data regarding the current content knowledge of students in courses without a FOCUS session and also to ensure that the items effectively measure student learning outcomes.

Post-Mortem Focus Group

As an added attitudinal measure, in the semester after they received FOCUS session instruction in BIOL 1014 or BIOL 1020, presumably when they are enrolled in their next required science course, students will be invited to participate in one of four follow-up focus groups. These focus groups of 20 students each (2 groups of BIOL 1014 completers and 2 groups of BIOL 1020 completers) will be asked to evaluate the FOCUS on Biology initiative. The QEP Coordinator will ensure that students from a variety of STEM and pre-health sciences majors participate. The purpose of the student focus groups is to determine the students' attitudes about the FOCUS sessions (i.e. What was liked? What, if anything, did not work? What do you remember? What would you change?). FOCUS group sessions will occur each semester during the five planned years of QEP implementation. Student feedback will be shared with the QEP Steering Committee.

Input from Constituents

Constituents, including community members, employers, alumni, university community members, involved faculty and graduate assistants, and peer mentors, will also be asked to contribute input into the strategies and success of the QEP and FOCUS sessions. This may be done by individual or group meetings or submission of written comments. These sessions will

occur each semester during the five planned years of QEP implementation, and feedback will be shared with the QEP Steering Committee.

Changes and Revisions

Throughout the implementation period, the FOCUS sessions will continue to be analyzed and improved based on all of the above-mentioned assessment strategies. With data from the quantitative measures as well as qualitative input from students, faculty, and community members, new active learning methods will be developed to replace strategies that are less helpful, and methods that were effective can be expanded. The effectiveness of graduate assistants and peer mentors will also be evaluated and enhanced. Ongoing research into best high impact practices will be incorporated into FOCUS sessions to improve target outcomes.

Section VII Table C

FOCUS Assessment Instruments	
The Critical thinking Achievement Test (CAT)	Tool to assess critical thinking and real-world problem solving; developed by Tennessee Technological University.
BIOL 1014 Discipline-Specific Knowledge	ULM Assessment to identify content learned in BIOL 1014; Course embedded questions developed by ULM faculty
BIOL 1020 Discipline-Specific Knowledge	ULM Assessment to identify content learned in BIOL 1020; Course embedded questions developed by ULM faculty
National Survey of Student Engagement (NSSE)	National tool used to gauge student perception and engagement. Specifically looking for changes in perception of reflective/integrative and higher-order learning skills and perceived gains in critical and analytical thinking.
Next Science Course Grade	Students in the defined cohort who enroll and complete BIOL 1014 or 1020 with a FOCUS session will be monitored to track their performance in their next science class (whether it is BIOL or any other science discipline).
Follow-up Student Focus Groups	Students who enroll and complete a BIOL course with a FOCUS session will be invited to participate in small FOCUS groups during their enrollment in their next science class (whether it is BIOL or any other science discipline).

Cohort for Assessment

For assessment purposes and tracking, ULM will use the IPEDS definition of a cohort. As such, the cohort will be the group of entering freshman students who have never attended any college and enter ULM in the fall term. This includes students who attended college for the first time in the prior summer term and students who have dual enrollment. This will exclude students who are transfers or students who repeat BIOL 1014 and 1020. The FOCUS session will be required for all students enrolled in BIOL 1014 and BIOL 1020. It is worth noting that students cannot take both BIOL 1014 and BIOL 1020. The data reported for the QEP will only contain students who fit the definition of the fall cohort. Cohorts will be reported on an academic year. The defined cohort will be coded as a FOCUS student within ULM for longitudinal tracking.
Based on data from the previous five years for enrollment in BIOL 1014 and BIOL 1020, the cohort for each group should be about 800 students. On average, 500 students that meet these criteria enroll in BIOL 1014 and 300 students that meet these criteria enroll in BIOL 1020.

VIII. Organizational Structure of the Plan

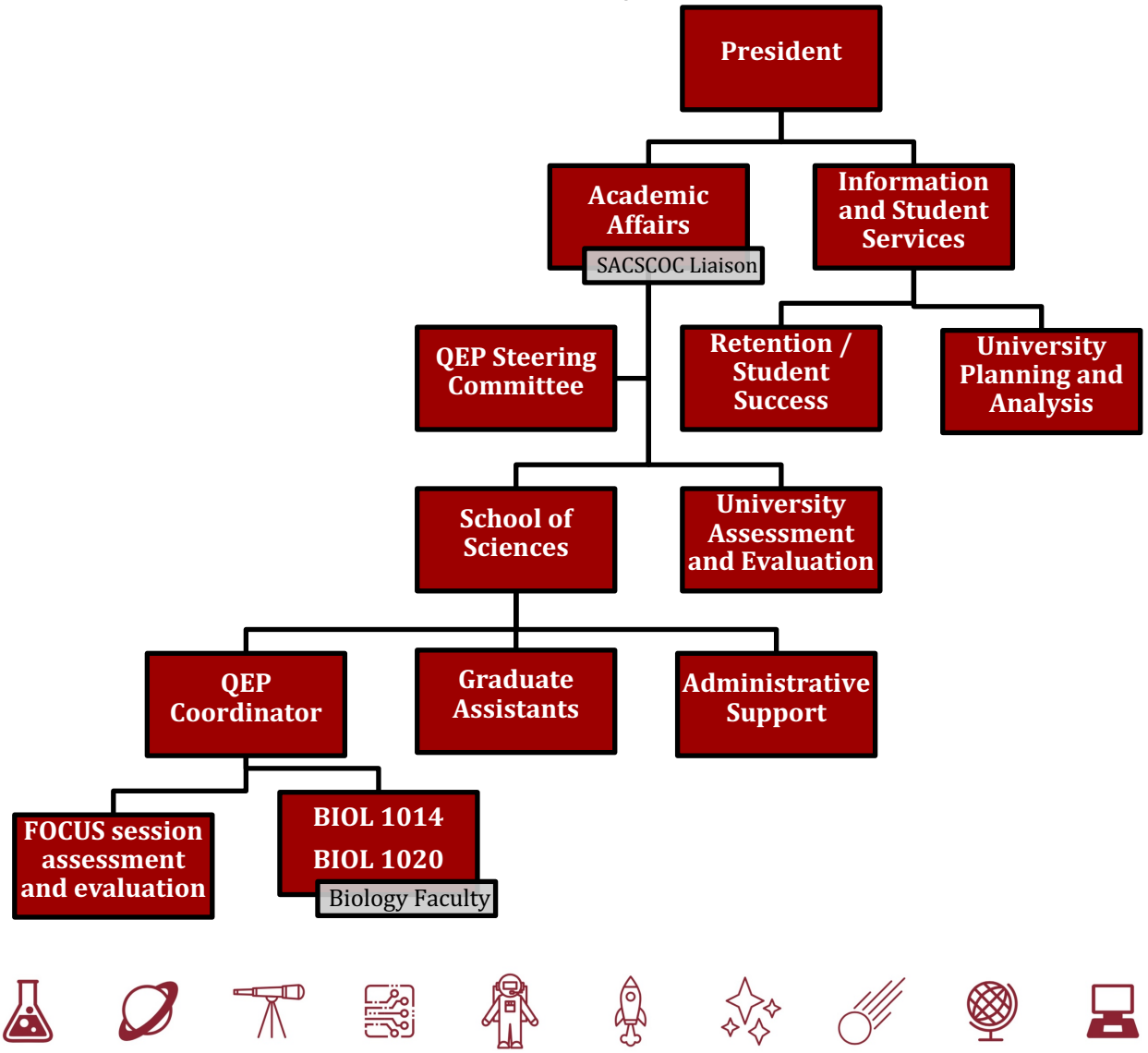
Oversight and Administration of QEP

ULM is committed to initiating and implementing the QEP and has outlined clear roles and responsibilities related to the tasks involved. The QEP will be administered primarily by the QEP Coordinator, a Biology faculty member hired specifically for this purpose. The Coordinator will operate under the supervision of the Director of the School of Sciences, who for QEP purposes reports directly to the Associate Vice President for Academic Affairs and SACSCOC Liaison.

Organizational Chart

The organizational chart below shows the lines of responsibility for implementation of the QEP as well as the correlation between selected participating institutional entities.

Section VIII Figure A



Description of Roles

QEP Coordinator- The QEP Coordinator will serve as a non-tenure track Biology instructor in the School of Sciences with 50% of time dedicated to teaching and overseeing the FOCUS sessions and 50% of time dedicated to data analysis for the QEP. The coordinator will design and provide instructional oversight for the additional contact hour for each section. The coordinator will document assessment results and provide analytical reports to the QEP Steering Committee. The QEP Coordinator will also be responsible for the production of annual progress and fifth year impact reports evaluating progress, implementing any changes or improvements to the plan, and communicating with constituents regarding progress.

Director of the School of Sciences – The Director of the School of Sciences will provide oversight of, and support to the QEP Coordinator for course redesign, redesign implementation, and assessment results analysis as well as facilitate communication between the QEP Coordinator and the QEP Steering Committee.

Associate Vice President for Academic Affairs and SACSCOC Liaison – The AVPAA will provide oversight of and support to the Director of the School of Sciences, ensuring the adequate supply and responsible use of resources as well as continued compliance with SACSCOC requirements.

Director of Assessment and Evaluation and Associate SACSCOC Liaison – The Director of Assessment and Evaluation will provide support to the QEP Coordinator in assessment design, implementation, and results analysis.

Director of Retention – The Director of Retention will provide QEP support through the coordination of Student Success Center participation, including the addition or revision of University Seminar (UNIV 1001) curricular elements and training tutors for assisting students with redesigned courses.

QEP Steering Committee – The Steering Committee will review reports prepared by the QEP Coordinator and provide feedback and recommendations for improvement to the QEP process and/or activities.

University Planning and Analysis – UPA will provide support to the QEP Coordinator in the collection of quantitative student success data.

Graduate Assistant Support – The School of Sciences will provide support to the QEP Coordinator through assignment of graduate assistant support for in-class activity facilitation and assessment implementation in the recitation hour as needed (four positions).

Administrative Support – The School of Sciences will provide administrative support to the QEP Coordinator for tasks such as financial resource documentation, facility scheduling, and report production.

Section VIII Table A

	QEP Steering Committee	
Name	**Title**	**Program**
Dr. Judy Fellows	Associate Vice President for Academic Affairs, SACSCOC Liaison	Academic Affairs
Dr. Anne Case Hanks	Director	School of Sciences
Dr. Chris Gissendanner	Associate Director	School of Sciences
Ms. Mallory Benedetto	QEP Coordinator	School of Sciences
Dr. Ann Findley	Professor of Biology	School of Sciences
Dr. Myra Lovett	Director	School of Education
Ms. Allison Thompson	Director, Associate SACSCOC Liaison	Assessment and Evaluation
Dr. Thomas Sasek	Associate Professor of Biology	School of Sciences
Ms. Stephanie Allen	Instructor of Biology	School of Sciences
Dr. Matthew Overturf	Assistant Professor of Biology	School of Sciences
Ms. Amanda Thompson	Instructor of Biology	School of Sciences

IX. Resources/Budget

ULM is committed to initiating and supporting the implementation of the QEP. The budget will support personnel, including graduate assistants; public relations for outreach and marketing; office operations; information technology; faculty development and support; and student support.

Section IX Table A

Budget Overview					
Academic Year	**2018-2019**	**2019-2020**	**2020-2021**	**2021-2022**	**2022-2023**
Personnel	$30,000	$102,000	$105,000	$105,000	$105,000
Faculty Development and Training	$3,000	$12,000	$5,000	$5,000	$5,000
Assessment Costs	$0	$7,800	$7,800	$7,800	$7,800
Student Support Materials	$4,000	$4,000	$2,000	$2,000	$2,000
Office Equipment	$2,000	$500	$500	$500	$500
Public Relations	$3,000	$1,000	$1,000	$1,000	$1,000
Total	$42,000	$127,300	$121,300	$121,300	$121,300

Section IX Table B

QEP Budget by Academic Year		
Academic Year 2018-19 (YR 1)		
Item Name	Item Cost	Notes
Personnel: $30,000		
QEP Coordinator	$30,000	• November 19, 2018 start date • 50% administrative, 50% teaching
Faculty Development and Training: $3,000		
QEP Coordinator Training	$3,000	• Active learning and high impact practices development
Student Support Materials: $4,000		
Resources and materials for active learning in FOCUS sessions	$4,000	• National case studies
Office Equipment: $2,000		
Computer and office supplies for QEP Coordinator	$2,000	
Public Relations: $3,000		
Marketing	$3,000	
2018-2019 Total: $42,000		

Academic Year 2019-2020 (YR 2)		
Item Name	Item Cost	Notes
Personnel: $102,000		
QEP Coordinator	$60,000	• 50% administrative, 50% teaching
4 FOCUS Teaching Assistants	$40,000	• $10,000/student/year
Peer Mentors	$2000	• 4 for Spring 2020 @ $500/mentor
Faculty Development and Training: $12,000		
CAT Training for QEP Coordinator and School of Sciences administrators	$7,000	
Travel to SACSCOC or QEP- related professional conferences	$5,000	
Assessment Costs: $7,800		
Purchase CAT Tests	$7,800	• $15 per test + $300 annual fee
Student Support Materials: $4,000		
Resources and materials for active learning in FOCUS sessions	$4,000	
Office Equipment: $500		
Office supplies for QEP coordinator	$500	
Public Relations: $1,000		
Marketing/Publications	$1,000	
2019-2020 Total: $127,300		

Academic Year 2020-2021 (YR 3)		
Item Name	Item Cost	Notes
Personnel: $105,000		
QEP Coordinator	$60,000	• 50% administrative, 50% teaching
4 FOCUS Teaching Assistants	$40,000	• $10,000/student/year
Peer Mentors	$5000	• 6 for Fall 2020, 4 for Spring 2021 @ $500/mentor
Faculty Development and Training: $5,000		
Travel to SACSCOC or QEP- related professional conferences	$5,000	
Assessment Costs: $7,800		
Purchase CAT Tests	$7800	• $15 per test + $300 annual fee
Student Support Materials: $2,000		
Resources and materials for active learning in FOCUS sessions	$2,000	
Office Equipment: $500		
Office supplies for QEP Coordinator	$500	
Public Relations: $1,000		
Marketing/Publications	$1,000	
2020-2021 Total: $121,300		

Academic Year 2021-2022		
Item Name	Item Cost	Notes
Personnel: $105,000		
QEP Coordinator	$60,000	• 50% administrative, 50% teaching
4 FOCUS Teaching Assistants	$40,000	• $10,000/student/year
Peer Mentors	$5000	• 6 for Fall 2021, 4 for Spring 2022 @ $500/mentor
Faculty Development and Training: $5,000		
Travel to SACSCOC or QEP- related professional conferences	$5,000	
Assessment Costs: $7,800		
Purchase CAT Tests	$7800	• $15 per test + $300 annual fee
Student Support Materials: $2,000		
Resources and materials for active learning in FOCUS sessions	$2,000	
Office Equipment: $500		
Office supplies for QEP Coordinator	$500	
Public Relations: $1,000		
Marketing/Publications	$1,000	
2021-2022 Total: $121,300		

Academic Year 2022-2023		
Item Name	Item Cost	Notes
Personnel: $105,000		
QEP Coordinator	$60,000	• 50% administrative, 50% teaching
4 FOCUS Teaching Assistants	$40,000	• $10,000/student/year
Peer Mentors	$5000	• 6 for Fall 2022, 4 for Spring 2023 @ $500/mentor
Faculty Development and Training: $5,000		
Travel to SACSCOC or QEP- related professional conferences	$5,000	
Assessment Costs: $7,800		
Purchase CAT Tests	$7,800	• $15 per test + $300 annual fee
Student Support Materials: $2,000		
Resources and materials for active learning in FOCUS sessions	$2,000	
Office Equipment: $500		
Office supplies for QEP Coordinator	$500	
Public Relations: $1,000		
Marketing/Publications	$1,000	
2022-2023 Total: $121,300		

X. Timeline for Implementation and Assessment

Based on the detailed timetable below, ULM is confident that the QEP can be completed and evaluated for success within a five-year period. The actions necessary to ensure this are specified below.

Spring 2019

The implementation of the QEP will begin with collecting baseline data in all sections of BIOL 1014 and 1020. The final exam for each section of these courses will contain locally developed diagnostic questions. The performance on those embedded questions as well as ABC rates in each section will be collected to provide a baseline measure for the QEP outcomes. By dedicating time to collect pertinent data before the FOCUS sessions are implemented, ULM will be able to accurately assess the effects of the QEP by showing changes in target outcomes in sections of BIOL 1014 and BIOL 1020 before and after the implementation of the FOCUS sessions.

In addition to collecting baseline data, the Spring 2019 semester will be used for preparation and training. Paper work will be submitted to the University Curriculum Committee to redesign BIOL 1014 and 1020 to include the 1-hour FOCUS session. The QEP coordinator will collaborate with lecture instructors to determine the concepts which present the greatest challenges for their students. This will be done by attending their classes, meeting individually and as a group, and submission of written input. During this semester, the QEP coordinator will also begin to prepare materials such as active learning tools, case studies and tutorials for FOCUS sessions; locally developed diagnostic questions; and a locally developed critical thinking test.

Summer 2019

The Summer of 2019 will primarily focus on analyzing the baseline data collected from Spring 2019 including embedded questions and success rates in BIOL 1014 and BIOL 1020 and the NSSE tests from Spring 2018. With this data and input from involved faculty and students, the QEP coordinator will prepare the first annual progress report on implementation progress, assessment results, and any changes that need to be made. The QEP coordinator and faculty members will also attend summer conferences to enhance the success of the QEP. These conferences may include a Case Study Conference and the Summer Institute on Scientific Teaching presented by the Yale Center for Teaching and Learning.

Fall 2019

Baseline data collection will continue in the Fall of 2019 to capture data from both a Spring cohort and Fall cohort of students and assess progress and impact from the QEP. The CAT test will be administered to a statistically significant number of students selected at random in BIOL 1014 and BIOL 1020, embedded questions added to final exams, and ABC rates monitored after final grade submissions. In addition to continued collaboration with faculty and preparation of materials for FOCUS sessions, training will continue as necessary for the QEP coordinator and any new ULM faculty.

Spring 2020
The first semester of FOCUS sessions will begin in Spring 2020. During University Week before the semester begins, graduate assistants and peer mentors will receive training on instruction for the FOCUS sessions. Throughout the semester, all sections of BIOL 1020 will incorporate a FOCUS session. At the close of the semester, the QEP and Student Learning Outcomes will be assessed through administration of the CAT, embedded diagnostic questions, and ABC rates in the course. The NSSE exam will also be administered in the Spring of 2020. A post-mortem focus group will be conducted with students, faculty and graduate assistants who participated in FOCUS session courses during the Spring 2020 semester.

Summer 2020
The Summer of 2020 will again focus on analyzing and evaluating data collected including the CAT tests, embedded questions, and success rates in BIOL 1014 and BIOL 1020. The results of the data will be shared with the university community so that comments may be collected. The information will be used to develop any course improvements and also to prepare the second annual progress report on implementation progress, assessment results, and continued directions. A budget review and analysis will also be conducted to ensure appropriate resources.

Fall 2020
FOCUS sessions will be implemented for the first time in BIOL 1014 in Fall 2020. Training for graduate assistants and peer mentors will again take place during University Week at the beginning of the semester. During this semester, all sections of BIOL 1020 and BIOL 1014 will incorporate a FOCUS session. At the close of the semester, the QEP and Student Learning Outcomes will be assessed through administration of the CAT, embedded diagnostic questions, and ABC rates in BIOL 1014 and BIOL 1020. For the students who participated in a FOCUS session for BIOL 1020 in Spring 2019 and enrolled in a subsequent science course for Fall of 2020, ABC rates will be collected for those subsequent courses. A post-mortem focus group will be conducted with students, faculty, and graduate assistants who participated in FOCUS session courses during the Fall 2020 semester.

Spring 2021
All sections of BIOL 1020 and BIOL 1014 will incorporate a FOCUS session. At the close of the semester, the QEP and Student Learning Outcomes will be assessed through administration of the CAT, embedded diagnostic questions, and ABC rates in the courses. For the students who participated in a FOCUS session for BIOL 1020 or BIOL 1014 in Fall 2020 and enrolled in a subsequent science course for Spring of 2021, ABC rates will be collected for those subsequent courses. A post-mortem focus group will be conducted with students, faculty, and graduate assistants who participated in FOCUS session courses during the Spring 2021 semester.

Summer 2021
By Summer 2021, ULM will have data on a full year of FOCUS session implementation, and significant conclusions regarding the success and efficacy of the QEP in both BIOL 1014 and

BIOL 1020 should be apparent. Analysis and evaluation of CAT tests, embedded questions and success rates in BIOL 1014 and BIOL 1020 as well as subsequent science courses will performed. These findings will be shared with the university community, and comments will be used to contribute to ongoing improvements to the FOCUS sessions. The summer will be used to develop and prepare new active learning methods for the FOCUS sessions based on feedback of what works best with students. Production of a third annual progress report on implementation progress, assessment results, and continued directions will be completed. A budget review and analysis will also be conducted to ensure appropriate resources.

Fall 2021
All sections of BIOL 1020 and BIOL 1014 will incorporate a FOCUS session. At the close of the semester, the QEP and Student Learning Outcomes will be assessed through administration of the CAT, embedded diagnostic questions, and ABC rates in BIOL 1014 and BIOL 1020 as well as subsequent science courses taken by students who participated in FOCUS session classes during previous semesters. A post-mortem focus group will be conducted with students, faculty, and graduate assistants who participated in FOCUS session courses during the Fall 2021 semester.

Spring 2022
All sections of BIOL 1020 and BIOL 1014 will incorporate a FOCUS session. At the close of the semester, the QEP and Student Learning Outcomes will be assessed through administration of the CAT, embedded diagnostic questions, and ABC rates in BIOL 1014 and BIOL 1020 as well as subsequent science courses taken by students who participated in FOCUS session classes during previous semesters. NSSE will also be administered during this semester. A post-mortem focus group will be conducted with students, faculty, and graduate assistants who participated in FOCUS session courses during the Spring 2022 semester.

Summer 2022
Analysis and evaluation of CAT tests, NSSE, embedded questions and success rates in BIOL 1014 and BIOL 1020 as well as subsequent science courses will performed. These findings will be shared with the university community, and comments will be used to contribute to ongoing improvements to the FOCUS sessions. The summer will be used to develop and prepare new active learning methods for the FOCUS sessions based on feedback of what works best with students. Production of a fourth annual progress report on implementation progress, assessment results, and continued directions will be completed. A budget review and analysis will also be conducted to ensure appropriate resources.

Fall 2022
All sections of BIOL 1020 and BIOL 1014 will incorporate a FOCUS session. At the close of the semester, the QEP and Student Learning Outcomes will be assessed through administration of the CAT, embedded diagnostic questions, and ABC rates in BIOL 1014 and BIOL 1020 as well as subsequent science courses taken by students who participated in FOCUS session classes during previous semesters. A post-mortem focus group will be conducted with students, faculty,

and graduate assistants who participated in FOCUS session courses during the Fall 2022 semester.

Spring 2023
All sections of BIOL 1020 and BIOL 1014 will incorporate a FOCUS session. At the close of the semester, the QEP and Student Learning Outcomes will be assessed through administration of the CAT, embedded diagnostic questions, and ABC rates in BIOL 1014 and BIOL 1020 as well as subsequent science courses taken by students who participated in FOCUS session classes during previous semesters. NSSE will also be administered during this semester. A post-mortem focus group will be conducted with students, faculty, and graduate assistants who participated in FOCUS session courses during the Spring 2023 semester.

Summer 2023
Analysis and evaluation of CAT tests, NSSE, embedded questions and success rates in BIOL 1014 and BIOL 1020 as well as subsequent science courses will be produced. These findings will be shared with the university community, and comments will be used to contribute to ongoing improvements to the FOCUS sessions. The summer will be used to develop and prepare new active learning methods for the FOCUS sessions based on comments of what works best with students. Production of a fifth annual progress report on implementation progress, assessment results and continued directions will be completed. A budget review and analysis will also be conducted to ensure appropriate resources.

Fall 2023
Implementation, assessment and evaluation of the plan will continue as before incorporating any new improvements.

Spring 2024
Implementation, assessment, and evaluation of the plan will continue as before incorporating any new improvements.

Summer 2024
Assessment, collection of feedback, and evaluation will continue. During the summer of 2024, the QEP coordinator will begin to compile the Fifth Year Impact Report.

Fall 2024
Focus sessions and changes to BIOL 1014 and BIOL 1020 will continue. The QEP coordinator will continue to write the Fifth Year Impact Report.

Spring 2025
The Fifth Year Impact report will be submitted March 15, 2025.

The table below contains a general timetable for the implementation and assessment of FOCUS on Biology. It reflects a phased-in approach to the implementation process to ensure that the work resulting from the course redesigns is manageable by faculty and graduate assistants.

Section X Table A

Implementation and Assessment Timeline	
Fall 2018	• QEP Coordinator hired and starts
Spring 2019	• Submit QEP to SACSCOC • Collect Baseline data of Diagnostic Assessment for each class • Prepare materials (active learning, case studies, tutorials) for FOCUS sessions in 1014 and 1020 • Work with lecture instructors in BIOL 1014 and 1020 • Submit University Curriculum Committee paperwork to redesign BIOL 1014 and 1020 to include the 1 hour FOCUS session • Development of a critical thinking assessment test
Summer 2019	• Analyze Spring baseline data, including Spring 2018 NSSE • Prepare first annual progress report on implementation progress, assessment results, and continued directions • Send QEP coordinator/faculty to Case Study Conference
Fall 2019	• Collect Baseline data in all sections of BIOL 1014 and 1020 by administering CAT before the implementation of FOCUS sessions • Collect Baseline data of Diagnostic Assessment for each class • Continue to prepare materials (active learning, case studies, tutorials) for FOCUS sessions in 1014 and 1020 • Work with lecture instructors in BIOL 1014 and 1020
Spring 2020	• Train FOCUS session GAs during University Week • Implement FOCUS sessions in 1020 • Collect Diagnostic Assessment for each class • Administer CAT at end of semester for BIOL 1020 sections • Administer NSSE 2020 • Conduct Post-Mortem Focus Group
Summer 2020	• Analyze and evaluate assessment data • Prepare second annual progress report on implementation progress, assessment results, and continued directions • Share results with university community • Develop any course improvements based on results • Conduct budget analysis

Fall 2020	• Train FOCUS session GAs during University Week • Implement FOCUS sessions in 1014 • Collect Diagnostic Assessment for each class • Administer CAT at end of semester for BIOL 1014 sections • Continue implementation and data collection in BIOL 1020 • Collect success rates in BIOL 1014 and 1020 and subsequent classes for previous cohort • Conduct Post-Mortem Focus Group
Spring 2020 – Summer 2024	• Continue with implementation, data collection, and analysis of FOCUS sessions in both BIOL 1014 and BIOL 1020 each semester • Administer NSSE 2022 • Conduct budget analysis

XII. Appendices

Appendix	Title
Appendix A	QEP Presentation
Appendix B	Math 1009 and 1001 Syllabi
Appendix C	Biology Syllabi
Appendix D	Exam Wrapper Metacognitive Exam Performance Review Activity

Appendix A - QEP Presentation

These slides were captured from presentation given in January 2018 and do not represent the entirety of the presentation to attendees.

Appendix B - Math 1009 and 1001 Syllabi

Please note: these are not complete syllabi. They have been edited to save space.

ULM College of Arts, Education and Sciences **Fall 2018**

Applied Algebra for College Students: MATH 1009-43056

I. Contact Information

Instructor: Ms. Hanh Le	**Office:** Walker 3-57
Email: le@ulm.edu The best way to communicate with your instructor is via email. The official student university email address is *username*@warhawks.ulm.edu, so you should only use your Warhawks email account when communicating about matters related to this course. Emails should contain a subject line, a proper salutation, your first and last name, course number, and day/time class meets (Math 1009 Tue/Thr 11:00AM). You should expect a response within one business day. If you do not receive a response within one business day, please resend the email.	
Office Phone Number: 318-342-1082 If you call your instructor's office and leave a voicemail message, you MUST also send an email.	
Office Hours: Monday/Wednesday: 12:00 –1:45; 3:30-4:45 Tuesday/Thursday: 8:15 – 9:15; 2:00-3:00	
Useful Websites: moodle.ulm.edu, www.mymathlab.com	
MyMathLab Course ID: le53448 **Technical Support:** For technical questions concerning MyMathLab, go to http://www.mymathlab.com/ and click Support or call 1-800-677-6337.	

✓After you read the syllabus completely, you are REQUIRED to complete the syllabus acknowledgement posted on Moodle. Failure to acknowledge the course syllabus will result in a grade of F for the course.

II. Course Description

Emphasis on applications involving: solving equations and inequalities; function properties and graphs; linear, quadratic, polynomial, exponential and logarithmic functions. This course is a prerequisite for MATH 1016 and MATH 1018.

III. Course Prerequisite/Corequisite

Math ACT is 19 or higher, successful completion (C or better) of MATH 0093, or concurrent enrollment in Math 1000

IV. Course Objectives and Outcomes

Students will develop the algebraic and problem-solving skills needed to interpret and solve problems in their respective disciplines. This course emphasizes the application of mathematics in the real world and the understanding of basic concepts, algebraic principles, and mechanics of the concepts being applied.

V. Course Topics

1. Solve linear equations and inequalities and their applications.
2. Solve quadratic equations and their applications by factoring, using the square root property, and applying the quadratic formula.
3. Solve radical, higher-degree, and literal equations and their applications.
4. Apply principles of direct, inverse, and joint variation.
5. Identify the domain and range, find intercepts, and evaluate various functions both algebraically and graphically.
6. Graph functions by plotting points and identify intervals on which a function increases, decreases, or is constant.
7. Calculate a line's slope and write the point-slope and slope-intercept forms of the linear equation.
8. Graph a linear function using its slope and y-intercept.
9. Evaluate piecewise-defined functions and their applications.
10. Solve systems of linear equations and their applications by substitution and elimination methods.
11. Determine a quadratic function's minimum or maximum value and graph parabolas using vertex and intercepts.
12. Evaluate exponential expressions, graph exponential functions by plotting points, and solve exponential equations by using like bases and logarithms.
13. Evaluate logarithmic expressions, graph logarithmic functions by plotting points, and solve logarithmic equations by using the one-to-one property and definition of a logarithm.
14. Solve real world application problems involving linear, quadratic, exponential, and logarithmic functions.

VI. Instructional Methods and Activities

- Learning will be facilitated through traditional lecture along with online homework assignments, review quizzes, and tests that will assess the student's ability to apply principles of algebra and mathematical logic to various disciplines. Students will attend class at the designated times for traditional lecture. Assignments will be completed using the online software MyMathLab. Students will be required to work on their assignments weekly in ULM's Mathematics Resource Center (MRC) where one-on-one tutoring is available.
- It is the student's responsibility to learn how to use MyMathLab. For system requirements, go to http://www.mymathlab.com/system-requirements. To register for MyMathLab, follow the registration instructions posted

MATH 1009 TENTATIVE COURSE SCHEDULE: FALL 2018

The instructor reserves the right to adjust the schedule as needed.

Lab 90 minutes	Day	Date	Lecture	Homework: Due by 11:59pm Review Quizzes: Due by class time
No Required Lab Time	Mon	8/20		
	Tue	8/21	1.1 Linear Equations	
	Wed	8/22		
	Thu	8/23	1.2 Linear Applications	
	Fri	8/24		HW Orientation
No Required Lab Time	Mon	8/27		
	Tue	8/28	1.3 Linear Inequalities	HW 1.1 Linear Equations
	Wed	8/29		
	Thu	8/30	1.4 Quadratic Equations	HW 1.2 Linear Applications
	Fri	8/31		
Lab Week 1 MRC	Mon	9/3	*Labor Day*	
	Tue	9/4	1.5 Quadratic Applications	HW 1.3 Linear Inequalities
	Wed	9/5		HW 1.4 Quadratic Equations
	Thu	9/6	1.6 Other Equations	HW 1.5 Quadratic Applications
	Fri	9/7		
Lab Week 2 MRC	Mon	9/10		
	Tue	9/11	2.1 Variation, Test 1 Review	HW 1.6 Other Equations
	Wed	9/12		
	Thu	9/13	**Test 1: Math Resource Center HW 1.1 – 1.6**	**QZ 1-A: HW 1.1 – 1.3 QZ 1-B: HW 1.4 – 1.6**
	Fri	9/14		
Lab Week 3 MRC	Mon	9/17		
	Tue	9/18	2.2 Relations & Functions	HW 2.1 Variation
	Wed	9/19		
	Thu	9/20	2.3 Domain, Range & Zeros	HW 2.2 Relations & Functions
	Fri	9/21		
Lab Week 4 MRC	Mon	9/24		
	Tue	9/25	2.4 Graphs of Functions	HW 2.3 Domain, Range & Zeros
	Wed	9/26		
	Thu	9/27	2.5 Linear Functions & Graphs	HW 2.4 Graphs of Functions
	Fri	9/28		
Lab Week 5 MRC	Mon	10/1		
	Tue	10/2	3.1 Piecewise-Defined Functions, Test 2 Review	HW 2.5 Linear Functions & Graphs
	Wed	10/3		
	Thu	10/4	**Test 2: Math Resource Center HW 2.1 – 2.5**	**QZ 2-A: HW 2.1 – 2.3 QZ 2-B: HW 2.4 – 2.5**
	Fri	10/5		
Lab Week 6 MRC	Mon	10/8		
	Tue	10/9	3.2 Linear Applications	HW 3.1 Piecewise-Defined Functions
	Wed	10/10		
	Thu	10/11	3.3 Systems of Equations	HW 3.2 Linear Function Applications
	Fri	10/12		

Applied Algebra for College Students Recitation: MATH 1000-43754
STUDENTS WITH A VISIBLE CELL PHONE WILL BE MARKED ABSENT.

I. Contact Information

Instructor: Mrs. A. Picard | **Office:** Walker 3-24

Email: picard@ulm.edu

The best way to communicate with your instructor is via email. The official student university email address is username@warhawks.ulm.edu, so you should only use your Warhawks email account when communicating about matters related to this course. Emails should contain a subject line, a proper salutation, your first and last name, course number, and day/time your class meets (Math 1000 MW 1pm). You should expect a response within one business day. If you do not receive a response within one business day, please resend the email.

Office Phone Number: 318-342-1937

Office Hours:

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
8:00 – 9:00 am	8:00 – 9:15 am	8:00 – 9:00 am	8:00 – 9:15 am	8:00 – 10:00 am
2:00 – 2:30 pm	2:00 – 2:30 pm	11:00 – 11:50 am in Walker 3-95 for Calculus	2:00 – 2:30 pm	
		2:00 – 2:30 pm		

Useful Websites: moodle.ulm.edu, www.mymathlab.com

✓After you read the syllabus completely, you are REQUIRED to verify, per your instructor's method, you have read, understand, and agree to abide by the policies in this document. Failure to acknowledge the course syllabus will result in a grade of NC for the course.

II. Course Description

This course consists of instructor-supervised learning sessions designed to supplement and enhance the course material from Math 1009. This course provides a structured environment for small group sessions where students will study and work together on mathematics.

III. Course Co-requisite

Concurrent enrollment in Math 1009.

IV. Course Objectives and Outcomes

Students will develop the algebraic and problem-solving skills needed to interpret and solve problems in their respective disciplines. This course emphasizes the application of mathematics in the real world and the understanding of basic concepts, algebraic principles, and mechanics of the concepts being applied.

V. Course Topics

1. Solve linear equations and inequalities and their applications.
2. Solve quadratic equations and their applications by factoring, using the square root property, and applying the quadratic formula.
3. Solve radical, higher-degree, and literal equations and their applications.
4. Apply principles of direct, inverse, and joint variation.
5. Identify the domain and range, find intercepts, and evaluate various functions both algebraically and graphically.
6. Graph functions by plotting points and identify intervals on which a function increases, decreases, or is constant.
7. Calculate a line's slope and write the point-slope and slope-intercept forms of the linear equation.
8. Graph a linear function using its slope and y-intercept.
9. Evaluate piecewise-defined functions and their applications.
10. Solve systems of linear equations and their applications by substitution and elimination methods.
11. Determine a quadratic function's minimum or maximum value and graph parabolas using vertex and intercepts.
12. Evaluate exponential expressions, graph exponential functions by plotting points, and solve exponential equations by using like bases and logarithms.
13. Evaluate logarithmic expressions, graph logarithmic functions by plotting points, and solve logarithmic equations by using the one-to-one property and definition of a logarithm.
14. Solve real world application problems involving linear, quadratic, exponential, and logarithmic functions.

Math 1009 Schedule: Monday/Wednesday

Lab 90 minutes	Day	Date	Lecture	Homework: Due by 11:59pm Review Quizzes: Due by class time
No Required Lab Time	Mon	8/20	1.1 Linear Equations	
	Tue	8/21		
	Wed	8/22	1.2 Linear Applications	
	Thu	8/23		
	Fri	8/24		HW Orientation
No Required Lab Time	Mon	8/27	1.3 Linear Inequalities	HW 1.1 Linear Equations
	Tue	8/28		
	Wed	8/29	1.4 Quadratic Equations	HW 1.2 Linear Applications
	Thu	8/30		
	Fri	8/31		
Lab Week 1 MRC	Mon	9/3	*Labor Day*	
	Tue	9/4		
	Wed	9/5	1.5 Quadratic Applications	HW 1.3 Linear Inequalities
	Thu	9/6		HW 1.4 Quadratic Equations
	Fri	9/7		
Lab Week 2 MRC	Mon	9/10	1.6 Other Equations	HW 1.5 Quadratic Applications
	Tue	9/11		
	Wed	9/12	2.1 Variation, Test 1 Review	HW 1.6 Other Equations
	Thu	9/13		
	Fri	9/14		
Lab Week 3 MRC	Mon	9/17	**Test 1: Math Resource Center HW 1.1 – 1.6**	**QZ 1-A: HW 1.1 – 1.3 QZ 1-B: HW 1.4 – 1.6**
	Tue	9/18		
	Wed	9/19	2.2 Relations & Functions	HW 2.1 Variation
	Thu	9/20		
	Fri	9/21		
Lab Week 4 MRC	Mon	9/24	2.3 Domain, Range & Zeros	HW 2.2 Relations & Functions
	Tue	9/25		
	Wed	9/26	2.4 Graphs of Functions	HW 2.3 Domain, Range & Zeros
	Thu	9/27		
	Fri	9/28		
Lab Week 5 MRC	Mon	10/1	2.5 Linear Functions & Graphs	HW 2.4 Graphs of Functions
	Tue	10/2		
	Wed	10/3	3.1 Piecewise-Defined Functions, Test 2 Review	HW 2.5 Linear Functions & Graphs
	Thu	10/4		
	Fri	10/5		
Lab Week 6 MRC	Mon	10/8	**Test 2: Math Resource Center HW 2.1 – 2.5**	**QZ 2-A: HW 2.1 – 2.3 QZ 2-B: HW 2.4 – 2.5**
	Tue	10/9		
	Wed	10/10	3.2 Linear Applications	HW 3.1 Piecewise-Defined Functions
	Thu	10/11		
	Fri	10/12		

Appendix C - Biology Syllabi

Please note: these are not complete syllabi. They have been edited to save space.

Course Syllabus
Biology 1014: Fundamentals of Anatomy and Physiology I
Fall 2018

Instructor: Mrs. Amanda Thompson, M.S., M.A.T.
Course Information: Biology 1014 sections 43776, 44082, 43775
Meets: T/R : 9:30-10:45am (CNSB 100), 11am-12:15pm (HANN 337), or 12:30 – 1:45pm (WALK 1-102), respectively.
Office Location: HANN 301
Office Hours: TBA (Starting second week of classes); Nov. 27th is the last day of office hours
Office phone: 318-342-1816
Email: athompson@ulm.edu (Best way to reach me!)

Course Description from the 2013-2014 Undergraduate Catalog: http://www.ulm.edu/academics/catalogs/
1014. FUNDAMENTALS OF ANATOMY AND PHYSIOLOGY I. 3 cr.
Introduction to anatomy and physiology, including cells, tissues, organs, and the integumentary, skeletal, muscular, and nervous systems. Prerequisite: Credit or registration in 1016. (Non-majors only.) Cannot be taken for credit if credit has been awarded for 3011 or 3012.

******Note**: A prerequisite to progress to Biol 1015 is a "C" or better in Biol 1014***

Course Objectives:
The *objective of this course* is to introduce you to the organization of the human body, structures that act to support the body and aid in movement, nervous control and integration of the human body.

Learning Outcomes:
Upon completion of this course, students should be able to do the following:
1) Name the various directional terms, body cavities, and specific planes of the human body when in anatomical position.
2) Identify and correctly describe the common characteristics for all 9 simple and stratified epithelial tissues, connective tissues, three muscular tissues, and nervous tissues within the human body.
3) Apply the concept of homeostasis and how it plays a role in the integumentary, skeletal, muscular, and nervous systems.
4) Identify the various components in the Integumentary System: Types of glands, nerves (encapsulated/unencapsulated), muscles (erector pili), hair follicle parts, and stratum layers of the epidermis, dermis, and hypodermis.
5) Identify the micro- and macro- anatomical characteristics of bone, types of bones, and differentiate between the axial and appendicular skeletons.
6) Identify the surface layer of musculature found in the human body
7) Name the steps involved in muscle contraction and relaxation events, how ATP plays a role in the process, and how actin/myosin behave in a sarcomere.
8) Name the parts of a typical neuron, how saltatory conduction happens, and how excitatory/inhibitory effects undergo summation.
9) Identify the steps involved in a typical action potential and how neurons return to resting membrane potential.
10) Compare and contrast the CNS with various levels of the PNS.
11) Explain how a synapse moves from one neuron to another neuron or target tissue by way of acetylcholine or epinephrine and how secondary neurons can affect their firing.
12) Name the parts of the spinal cord, hindbrain, midbrain, and cerebrum and explain their individual functions.
13) Identify the individual cranial nerves by Roman numeral and name and tell which are motor, sensory or have both functions.
14) Trace the pathways of sensory stimuli from the spinal cord to various hindbrain, midbrain, and cerebral areas and then back through the motor neuronal pathways to effector organs.
15) Apply the concept of homeostasis to ways the sympathetic and parasympathetic nervous systems behave in specific biological situations and how medications can enhance or dampen these effects in humans.

Required Textbook & Course Materials:
Digital resource access code to McGraw-Hill's Connect Plus software which includes an electronic version of *Seeley's Anatomy and Physiology*, 11th ed. by VanPutte, Regan, and Russo and the paper lecture notes packet entitled *Lecture Notes for Human Anatomy & Physiology*, 2nd ed. by Findley & Ouchley. Students are responsible for reading the material in the e-text that corresponds to the information presented in lecture that will primarily come from the lecture notes packet. Both the access code and lecture notes are required for this class.

Fall 2018 Course Calendar (Tentative)

Due Dates for Course Activities: Participation Activities will be added at random times throughout the semester. Before each new chapter is presented in class, students are expected to have completed the corresponding LearnSmart Chapter within Connect. Failure to do so will result in a lower Connect grade and will affect the overall course grade adversely.

Date(s)	Topic(s) Covered	Assignment(s)	Deadline(s) (online/Moodle & Connect)
Aug. 21st	Class Intro & Ch. 1	Quiz 1 Opens (Moodle)/ Obtain Access Code & lecture notes from bookstore	
Aug. 23rd.	Connect Plus Registration	*LSCh.1 &LSCh.2* (Connect)	*LearnSmart Ch.1* Due Mon., Aug. 27th (11:45pm) (Connect)
Aug. 28th	Ch.2	Quiz 2 Opens (Moodle)	*LS Ch.2 Due* today (hour before class) (Connect); Q1 Due: (Tues., Aug. 28th, 11:45pm) (Moodle)
Aug. 30th	Ch.2	*LSCh.3 (Connect)*	Q2 Due: (Thurs., Aug. 30th, 11:45pm)(Moodle)
Sept. 4th	Ch.3	Quiz 3 Opens (Moodle)	*LS Ch.3 Due* today (hour before class) (Connect)
Sept. 6th	Ch. 3 completed	Study for Exam 1	Q3 Due: (Thurs., Sept. 6th, 11:45pm) (Moodle)
Sept. 11th	**Exam 1 – in class**	*LSCh.4 (Connect)*	Bring pencil and 150-question scantron
Sept. 13th	Ch.4	Quiz 4 Opens (Moodle)	*LS Ch.4 Due* today (hour before class) (Connect)
Sept. 18th	Ch.4 completed	*LSCh.5 (Connect)*	Q4 Due: (Tues., Sept. 18th, 11:45pm) (Moodle)
Sept. 20th	Ch.5	Quiz 5 Opens; *LSCh.6 (Connect)*	*LS Ch.5 Due* today (hour before class) (Connect)
Sept. 25th	Ch.6	Quiz 6 Opens; *LSCh.7 (Connect)*	Q5 Due: (Tues., Sept. 25th, 11:45pm) (Moodle); *LS Ch. 6 Due* today (hour before class) (Connect);
Sept. 27th	Ch.7	Q7 Opens; *LSCh.8 (Connect)*	Q6 Due: (Thurs., Sept. 27th, 11:45pm) (Moodle) *LS Ch.7 Due* today (hour before class) (Connect)
Oct. 2nd	Ch.8	Quiz 8 Opens Study for Exam 2	Q7 Due: (Tues., Oct. 2nd, 11:45pm) (Moodle) *LS Ch.8 Due* today (hour before class) (Connect); Q8 Due: (***Wed., Oct. 3rd***, 11:45pm) (Moodle)
Oct. 4th	**Exam 2 – in class**	*LSCh.11 (Connect)*	Bring pencil and 150-question scantron
Oct. 9th	Ch.11	Quiz 11 Opens	*LS Ch.11 Due* today (hour before class) (Connect)
Oct. 11th	Ch. 11 completed	*LSCh.9 (Connect)*	Q11 Due: (Thurs., Oct. 11th, 11:45pm) (Moodle)
Oct. 16th	Ch.9	Quiz 9 Opens	*LS Ch.9 Due* today (hour before class) (Connect)
Oct. 18th	Ch.9 completed	*LSCh.10 (Connect)*	Q9 Due: (Thurs., Oct. 18th, 11:45pm) (Moodle)
Oct. 23rd	Ch.10	Quiz 10 Opens; *LSCh.12 (Connect)*	*LS Ch.10 Due* today (hour before class) (Connect); Q10 Due: (**Wed., Oct. 24th**, 11:45pm) (Moodle)
Oct. 25th-26th	**No class = Fall Break Holiday; Return to regular class schedule on Tuesday, Oct. 30th; Be prepared!**		
Oct. 29th	**Final Drop Day – "W" grade on transcript** (W = Withdraw); drop/stop coming after this date = "F" in class.		
Oct. 30th	Ch.12	Quiz 12 Opens Study for Exam 3	*LS Ch.12 Due* today (hour before class) (Connect); Q12 Due: (**Wed., Oct. 31st,** 11:45pm) (Moodle)
Nov. 1st	**Exam 3 – in class**	*LSCh.13 (Connect)*	Bring a pencil and 150-question scantron
Nov. 6th	Ch.13	Quiz 13 Opens; *LSCh.14 (Connect)*	*LS Ch.13 Due* today (hour before class) (Connect);
Nov. 8th	Ch.14. No Moodle quiz /WS instead;	*LSCh.15 (Connect)*	*LS Ch.14 Due* today (hour before class) (Connect); Q13 Due: (Thurs., Nov. 8th, 11:45pm) (Moodle)
Nov. 13th	Ch.15	Quiz 14 Opens; *LSCh.16 (Connect)*	*LS Ch.15 Due* today (hour before class) (Connect); Ch.14 WS Due at beginning of class today, Apr. 13th
Oct. 25th-26th	**No class = Fall Break Holiday; Return to regular class schedule on Tuesday, Apr. 25th**		
Nov. 15th	Ch.16	Quiz 15 Opens	*LS Ch.16 Due* today (hour before class) (Connect); Q14 Due: (Thurs., Nov. 15th, 11:45pm) (Moodle)
Nov. 20th	Q&A Class Review (student led = 20/25 minutes max)		Q15 Due: (Tues., Nov. 20th, 11:45pm) (Moodle)
Nov. 21st – 23rd	**No class = Thanksgiving Holiday; No class meetings after Nov. 20th**		
Nov. 27th	**Seniors Exam 4 (final)= in class**/no class for non-graduating students (Senior grades due Dec. 3rd on Banner-3pm.)		
Dec. 3rd – 7th	**Exam 4 (non-graduating students only)** Bring a pencil and 150-question scantron (purchase at Bookstore/SUB) **Check the posted ULM calendar for our exam date. I will do the same and post it to Moodle soon.		
Dec. 8th	Commencement Ceremony (10am in Coliseum)		
Dec. 10th	Final Grades Due to Banner by 3pm; Course Moodle site will be unavailable after this time/date		

The instructor reserves the right to change, add to, or delete any of the above contents within the course calendar as deemed necessary throughout the semester. Please understand that all dates are tentative, but this serves as a rough scope and sequence for the course. Always follow what is posted on Moodle and Connect concerning any deadlines and remember to finish the Connect LearnSmart Chapters BEFORE the chapter is discussed in class on a particular day.

General Biology: Biol 1020-43202
TR 12:30 – 1:45 pm

I. Instructor Contact Information

Dr. Ann Findley
CNSB 302
342-1817
afindley@ulm.edu

Office Hours
MTWR 9:00 am – 11:00 am; W 2:00 pm – 4:00 pm

Supplemental Instructor
Mallory Crawford; crawfomb@warhawks.ulm.edu

II. Course Description

A course designed for those students majoring in the sciences. Course content deals with scientific methodology, biological chemistry, DNA and the genetic code, cell structure and cell metabolism.

III. Course Objectives and Outcomes: Upon completion of this course, you should be able to:

- discuss the nature of biology and the scientific method;
- discuss the chemical foundation of biological processes and biochemical pathways;
- compare the basic structure of prokaryotic and eukaryotic cell structure and organization;
- discuss the basic principles of heredity, the genetic code, and cellular division;
- Critically analyze and think about what you read in order to express your ideas clearly to others.

IV. Textbook

Principles of Biology, 2nd ed, Brooker et al., 2018 (customized) + Connect access code with SmartBook/eText. Students are responsible for reading the material in the text that corresponds to the information presented in the lecture.

V. Support Materials

A. An outline for each lecture will be available through the ULM Moodle system. These outlines will provide the framework for each lecture and allow students to remain on topic.
B. Online SmartBook learning exercises are designed to help students preview the lecture material and test their understanding.

VI. Grading

A. Activity Points

These activity points may be derived from a variety of sources: in-class assignments, Moodle & SmartBook assignments, participation, etc. In total, the assignments will be worth 20-25% of your final grade. No make-up opportunities exist for activities. Make-ups for excused absences will be allowed at the discretion of the instructor.

B. Exams

Throughout the semester each student will take four exams. Each exam will be worth 100 points. The final may cover topics that overlap other exams. Make-up exams will be given for excused absences only – and will be administered on two dates during the semester. The first date will occur prior to the university's drop date. Students may not remove exams from the classroom. Students may review graded exams during office hours only.

General Biology: Biol 1020-43202
TR 12:30 – 1:45 pm

VIII. Tentative Course Schedule

Lectures Covered	Exam	Date
Chapters 1, 2, 3, and 4	Exam 1	Thursday --- September 13, 2018
Chapters 5, 6, and 7	Exam 2	Thursday --- October 11, 2018
Chapters 9, 14, 15, 16	Exam 3	Thursday --- November 8, 2018
Chapters 10, 12, 13, +	Exam 4	TBD

Exam 4 will occur during final's week in normal classroom.

The instructor reserves the right to adjust the schedule and assign material in class when necessary

Attendance: Attendance regulations, as per the current university catalogue, will be followed. The following are the only conditions that will be accepted for a missed lab: **1) authorized University trips, 2) Illness, and 3) Death of an immediate family member**. See Student Policy Manual for further information. You must provide written verification for your absence to be excused. The instructor reserves the right to validate any written excuse. Missed class meetings due to extreme circumstances that do not fall into the three areas above will be dealt with on a case by case basis. Fraudulent documentation will be reported to your academic Dean. The instructor reserves the right to remove students, at any time, for lack of attendance or participation.

Class policies & procedures: Class policies and procedures as stated in the current ULM *Student Policy Manual & Organizational Handbook* will be followed (http://www.ulm.edu/studentpolicy/).

A variety of support services are available to students through the Student Success Center, Counseling Center, Special Needs, and Student Health Services. It is your responsibility to request such assistance if the need arises. Information about such services are as follows:
Student Success Center (http://www.ulm.edu/cass/)
Counseling Center (http://www.ulm.edu/counselingcenter/)
Special Needs (http://www.ulm.edu/counselingcenter/special.htm), and
Student Health Services (http://www.ulm.edu/shs)
and are available at the following Student Services web site *http://www.ulm.edu/studentaffairs/*

I expect all students to conduct themselves in a manner that is respectful to all in attendance. Students who are chronically late for class, who talk in class, or who get up and leave during class exhibit a lack of respect for both the instructor and their fellow students. All cellular telephones should be turned off and stored during class.

Academic Integrity: In addition to the course specific requirements for professionalism and ethics, students must also observe the ULM published policy on Academic Dishonesty (see Page 4 in ULM *Student Policy Manual* -- http://www.ulm.edu/studentpolicy/).

Class correspondence: Class announcements will be posted on Moodle. In addition, correspondence may also be sent to the class via e-mail. Any such correspondence will be sent to your WARHAWKS e-mail account only. All e-mail correspondence to the instructor must use ULM e-mail accounts.

Appendix D - Exam Wrapper Metacognitive Exam Performance

Biology Self-Assessment & Reflection: Exam #1 Name: _____

DUE: At the next class meeting, hand-in this completed form at the beginning of lecture.

This form will help you to analyze your exam performance and find strategies that work best for you in learning the material for this course. Self-assessing your progress and adjusting your study strategies accordingly is what effective learners tend to do. Please answer the questions below sincerely. Your responses will have no impact on your grade, but they will inform the instructional team about how we can best support your learning.

1. Approximately how much time did you spend preparing for this exam? _____

2. What percentage of your test-preparation time was spent in each of these activities?
   a. Skimming textbook chapters _____
   b. Reading textbook chapters thoroughly _____
   c. Reviewing your own notes _____
   d. Working on practice exam questions _____
   e. Reviewing materials from Moodle/Connect _____
   f. Other _____
      (Please specify: _____)

3. As you look over your graded exam, analyze where/how you lost points. Fill in the blacks below with the number of points you lost due to each of the following:
   a. Trouble applying definitions _____
   b. Trouble remembering structures _____
   c. Lack of understanding of a concept _____
   d. Unclear Expectations _____
   e. Not knowing how to begin a problem _____
   f. Careless mistakes _____
   g. Other _____
      (Please specify: _____)

4. Based on your responses to the questions above, name 3 things you plan to do differently in preparing for the next exam. For instance, will you just spend more time, change a specific study habit (if so, name it), try to sharpen some other skill (if so, name it), use other resources more, or something else?

5. What can we do to help support your learning and your preparation for the next exam?

Modified from https://www.cmu.edu/teaching/designteach/teach/examwrappers/

Bibliography

Blickenstaff, J.C. (2005). Women and science careers: leaky pipeline or gender filter? *Gender and Education*, *17*(4), 369-386.

Brown, P. J. (2010). Process-oriented guided-inquiry learning in an introductory anatomy and physiology course with a diverse student population. *Advances in physiology education*, *34*(3), 150-155.

Camfield, E. K., & Land, K. M. (2017). The evolution of student engagement: Writing improves teaching in introductory biology courses. *Bioscene: Journal of College Biology Teaching*, *43*(1), 20-26.

Center for Educational Innovation. (2018). Active learning. *University of Minnesota*. Retrieved from https://cei.umn.edu/active-learning

Center for Research on Learning and Teaching. (2016). Active learning. *University of Michigan.* Retrieved from http://www.crlt.umich.edu/active_learning_introduction

Chalmers, A. F. (2013). *What is this thing called science* (4th ed.). Queensland, Australia: University of Queensland Press & Hackett Publishing Company, Inc.

Chen, X., & Soldner, M. (2013). STEM Attrition: College students' path into and out of STEM fields (NCES 2014-001). Retrieved from http://nces.ed.gov/pubs2014/2014001rev.pdf

Colvin, J. W., & Ashman, M. (2010). Roles, risks, and benefits of peer mentoring relationships in higher education. *Mentoring & Tutoring: Partnership in Learning*, *18*(2), 121-134.

Cook, E., Kennedy, E., & McGuire, S. Y. (2013). Effect of teaching metacognitive learning strategies on performance in general chemistry courses. *Journal of Chemical Education,* 90(8), 961-967.

Coutinho, S. A. (2007). The relationship between goals, metacognition, and academic success. *Educate~*, *7*(1), 39-47.

Deslauriers, L., Schelew, E., & Wieman, C. (2011). Improved learning in a large-enrollment physics class. *Science*, *332*(6031), 862-864.

Drew, C. (2011, November 4). Why science majors change their minds (it's just so darn hard). *New York Times.* Retrieved from https://www.nytimes.com/2011/11/06/education/edlife/why-science-majors-change-their-mind-its-just-so-darn-hard.html

Edgcomb, M. R., Crowe, H. A., Rice, J. D., Morris, S. J., Wolffe, R. J., & McConnaughay, K. D. (2010). Peer and near-peer mentoring: Enhancing learning in summer research programs. *CUR Quarterly*, *31*(2), 18-25.

Finn, K., & Campisi, J. (2015). Implementing and evaluating a peer-led team learning approach in undergraduate anatomy and physiology. *Journal of College Science Teaching*, *44*(6), 38-43.

Freeman, S., Eddy, S. L., McDonough, M., Smith, M. K., Okoroafor, N., Jordt, H., & Wenderoth, M. P. (2014). Active learning increases student performance in science, engineering, and mathematics. *Proceedings of the National Academy of Sciences*, *111*(23), 8410-8415.

Gezer-Templeton, P. G., Mayhew, E. J., Korte, D. S., & Schmidt, S. J. (2017). Use of exam wrappers to enhance students' metacognitive skills in a large introductory food science and human nutrition course. *Journal of Food Science Education*, *16*(1), 28-36.

Haak, D. C., HilleRisLambers, J., Pitre, E., & Freeman, S. (2011). Increased structure and active
learning reduce the achievement gap in introductory biology. *Science*, *332*(6034), 1213-1216.

Hanauer, D. I., Graham, M. J., Betancur, L., Bobrownicki, A., Cresawn, S. G., Garlena, R. A., ... & Jacobs, W. R. (2017). An inclusive Research Education Community (iREC): Impact of the SEA-PHAGES program on research outcomes and student learning. *Proceedings of the National Academy of Sciences*, 201718188.

Harackiewicz, J. M., Canning, E. A., Tibbetts, Y., Priniski, S. J., & Hyde, J. S. (2016). Closing achievement gaps with a utility-value intervention: Disentangling race and social class. *Journal of Personality and Social Psychology*, *111*(5), 745. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4853302/

Hopper, M. (2011). Student enrollment in a supplement course for anatomy and physiology results in improved retention and success. *Journal of College Science Teaching, 40*(3), 70-79.

Jordan, T. C., Burnett, S. H., Carson, S., Caruso, S. M., Clase, K., DeJong, R. J., ... & Findley, A. M. (2014). A broadly implementable research course in phage discovery and genomics for first-year undergraduate students. *MBio*, *5*(1), e01051-13.

Mellor, D. T., Brooks, W. R., Gray, S. A., & Jordan, R. C. (2015). Troubled transitions into college and the effects of a small intervention course. *Journal of College Student Retention: Research, Theory & Practice*, *17*(1), 44-63.

National Assessment of Educational Progress (2015). *The Nation's Report Card*. U.S. Department of Education. Institute of Education Sciences, National Center for Education Statistics. Retrieved from https://www.nationsreportcard.gov/

National Center for Educational Statistics (2014). *Beginning Postsecondary Students*. U.S. Department of Education. Institute of Education Sciences, National Center for Education Statistics. Retrieved from https://nces.ed.gov/datalab/powerstats/pdf/bps2014_subject.pdf

National Center for Educational Statistics (2017). *University of Louisiana Monroe: Enrollment*. U.S. Department of Education. Institute of Education Sciences, National Center for Education Statistics. Retrieved from · https://nces.ed.gov/collegenavigator/?q=university+of+louisiana+monroe&s=all&fv=159993&id=159993#enrolmt

National Science Board. (2008). *Science and engineering indicators 2008.* Arlington, VA: National Science Foundation.

National Science Board. (2014). *Science and engineering indicators 2014*. Arlington, VA: National Science Foundation.

National Science Foundation. (2014). What percentage of freshmen intend to major in an S&E field when they start college? *STEM Education Data*. Retrieved from https://nsf.gov/nsb/sei/edTool/data/college-09.html

Noel-Levitz. (2013). *The attitudes and motivations of college transfer students*. Coralville, Iowa: Noel-Levitz.

Noel-Levitz. (2018). *2018 National freshman attitudes report*. Coralville, Iowa: Noel-Levitz.

Otto, S., Evins, M. A., Boyer-Pennington, M., & Brinthaupt, T. M. (2015). Learning communities in higher education: Best practices. *Journal of Student Success and Retention Vol*, *2*(1).

Parker Sibert, C. J., Bissell, A. N., & Macphail, R. A. (2011). Developing metacognitive and problem-solving skills through problem manipulation. *Journal of Chemical Education*, 88(11), 1489-1495.

Poorman, S. G., & Mastorovich, M. L. (2016). Using metacognitive wrappers to help students enhance their prioritization and test-taking skills. *Nurse Educator*, 41(6), 282-285.

Ramsey, K., & Baethe, B. (2013). The keys to future STEM careers: Basic skills, critical thinking, and ethics. *Delta Kappa Gamma Bulletin*, *80*(1), 26.

Sansgiry, S. S., & Sail, K. (2006). Effect of students' perceptions of course load on test anxiety. *American Journal of Pharmaceutical Education*, *70*(2), 1-6.

Schraw, G., & Dennison, R. S. (1994). Assessing metacognitive awareness. *Contemporary Educational Psychology*, *19*(4), 460-475.

Sithole, A., Chiyaka, E. T., McCarthy, P., Mupinga, D. M., Bucklein, B. K., & Kibirige, J. (2017). Student attraction, persistence and retention in STEM programs: Successes and continuing challenges. *Higher Education Studies*, *7*(1), 46-59.

Smith, B. L. (1993). Creating learning communities. *Liberal Education*, *79*(4), 32-39.

Smith, B. L. (2001). The challenge of learning communities as a growing national movement. *Peer Review*, *4*(1), 4-8.

Smith, M. K., Wood, W. B., Adams, W. K., Wieman, C., Knight, J. K., Guild, N., & Su, T. T. (2009). Why peer discussion improves student performance on in-class concept questions. *Science*, *323*(5910), 122-124.

Stein, B., Haynes, A., Redding, M., Harris, K., Tylka, M., & Lisic, E. (2010). Faculty driven assessment of critical thinking: National dissemination of the CAT instrument. In *Technological Developments in Networking, Education and Automation* (pp. 55-58). Springer, Dordrecht.

Styers, M. L., Van Zandt, P. A., & Hayden, K. L. (2018). Active Learning in Flipped Life Science Courses Promotes Development of Critical Thinking Skills. *CBE—Life Sciences Education*, *17*(3), ar39.

Suchman, E. L. (2014). Changing academic culture to improve undergraduate STEM education. *Trends in Microbiology*, *22*(12), 657-659.

Tanner, K. D. (2012). Promoting student metacognition. *CBE—Life Sciences Education*, 11(2), 113-120.

Twigg, C. A. (2005). Course Redesign Improves Learning and Reduces Cost. Policy Alert. *National Center for Public Policy and Higher Education*.

Vaughan, N. D. (2010). A blended community of inquiry approach: Linking student engagement and course redesign. *The Internet and Higher Education*, *13*(1-2), 60-65.

Veselinovska, S.S., Gudeva, L.K., & Djokic, M. (2011). The effect of teaching methods on cognitive achievement in biology studying. *Procedia-Social and Behavioral Sciences*, *15*, 2521-2527.